DOCUMENT RESUME

ED 102 521 CS 001 643

AUTHOR	Haynes, James L.; And Others
TITLE	Relation Education Index Norms for 500 Picture Pairs and 10 Relations: High School Sample. Technical Report No. 6.
INSTITUTION	Office of Naval Research, Washington, D.C. Personnel and Training Research Programs Office.
REPORT NO	TR-6
PUB DATE	Nov 74
NOTE	68p.
EDRS PRICE	MF-$0.76 HC-$3.32 PLUS POSTAGE
DESCRIPTORS	Cognitive Processes; *Illustrations; *Learning Modalities; Logical Thinking; *Reading Research; Secondary Education; Testing; *Visual Stimuli; *Written Language
IDENTIFIERS	REI; Relation Education Index

ABSTRACT

Mode of presentation (word vs. picture) is said to be a factor in social class differences in performance on analogy tests. To investigate this contention, data were needed on equivalent word and picture analogy test performance. This report presents data on relation education index (REI) norms for 500 picture pairs collected in the process of developing equivalent word and picture test forms. The subjects in this study were high school students in grades 9-12 from six high schools in Shelby County, Tennessee, and three high schools in Tipton County, Tennessee. The data are presented in table and narrative form, and may be compared with REI data on word pairs reported in previous technical reports. (RB)

ED102521

BEST COPY AVAILABLE

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

SCOPE OF INTEREST NOTICE
The ERIC Facility has assigned this document for processing to: CS IM
In our judgement, this document is also of interest to the clearinghouses noted to the right. Indexing should reflect their special points of view.

Technical Report No. 6

RELATION EDUCTION INDEX NORMS FOR 500 PICTURE PAIRS AND 10 RELATIONS: HIGH SCHOOL SAMPLE

James L. Haynes, Rene' V. Dawis, Eileen Q. Monson,
Frederick G. Lopez and Leodegario V. Soriano

November 1974

Technical Report

Prepared under Contract No. N00014-67-A-0113-0030
NR 150-352
Personnel and Training Research Programs
Office of Naval Research (Code 458)
Arlington, Virginia 22217

Approved for public release; distribution unlimited.
Reproduction in whole or in part is permitted for
any purpose of the United States Government.

CS 001 643

BEST COPY AVAILABLE

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: Technical Report No. 6	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): Relation Eduction Index Norms for 500 Picture Pairs and 10 Relations: High School Sample	5. TYPE OF REPORT & PERIOD COVERED: Technical Report
6. PERFORMING ORG. REPORT NUMBER	
7. AUTHOR(s): James L. Haynes, Rene' V. Dawis, Eileen Q. Monson, Frederick G. Lopez and Leodegario V. Soriano	8. CONTRACT OR GRANT NUMBER(s): N00014-67-A-0113-0030
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Department of Psychology, University of Minnesota, Minneapolis, Minnesota 55455	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 61153N RR 042-04-01; RR 042-04 NR 150-352
11. CONTROLLING OFFICE NAME AND ADDRESS: Personnel and Training Research Programs, Office of Naval Research (Code 458), Arlington, Virginia 22217	12. REPORT DATE: November 1974
	13. NUMBER OF PAGES: 58
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited. Reproduction in whole or in part is permitted for any purpose of the United States Government.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

analogy
analogical reasoning
cognition of figural relations
logical relations
pictorial analogies
pictorial reasoning

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Mode of presentation (word vs. picture) is said to be a factor in social class differences in performance on analogy tests. To investigate this contention, data are needed on equivalent word and picture analogy test performance. This report presents data (relation eduction indices) collected in the process of developing equivalent word and picture test forms. These data can be compared with REI data on word pairs reported in previous technical reports.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

BEST COPY AVAILABLE

Relation Eduction Index Norms for 500 Picture Pairs and 10 Relations: High School Sample

James L. Haynes, Rene' V. Dawis, Eileen Q. Monson, Frederick G. Lopez and Leodegario V. Soriano

In previous technical reports (Dawis et al., 1974a; Soriano et al., 1974; Dawis et al., 1974b) several variables were identified as among those most likely to influence the difficulty of verbal analogy tests. These variables are word difficulty (vocabulary level), type of relation, and relation eduction frequency. Word difficulty is important because it is this variable which will likely determine whether the test functions as a measure of reasoning ability or a measure of word knowledge. The higher the difficulty level of the words used in the test, the more likely it is that the test will simply measure vocabulary level, and not analogical reasoning. Dawis and Siojo's (1972) literature review showed that it is often difficult to interpret verbal analogies in terms of a reasoning process because of their high loading on a verbal factor.

It has been hypothesized that the difficulty of solving verbal analogies may be related to the type of relation involved (Soriano et al., 1974). Type of relation refers to the categorization of the logical relations linking items in an analogy pair.

Relation eduction frequency is the frequency with which a given relation is seen in a given word pair. This variable has been operationalized by developing a quantitative index (relation eduction index) of the frequency with which subjects educe a given relation from a word pair. For a word pair and a relation, the relation eduction index (REI) is the relative frequency with which the given relation is judged by subjects to be one which links the given pair of words (Dawis et al., 1974a; Soriano et al.,

1974, Dawis et al., 1974b).

Verbal analogy and picture analogy items have long been used in measures of intelligence, although the picture item is used less frequently (Dawis and Siojo, 1972). When one substitutes picture items for their word equivalents in the construction of analogy tests, it is often assumed that the two forms measure the same trait, i.e., analogical reasoning. However, this assumption might not rest on firm ground. Guilford and Hoepfner (1971) have shown that verbal and pictorial analogies load on different factors, thus giving support to the hypothesis that analogical reasoning might be a function of the mode (verbal vs. pictorial) of presenting the stimulus pairs to the subjects.

Thus, certain important questions exist concerning analogy tests: Can the verbal factor be separated from the reasoning factor in verbal analogies? How similar are the reasoning factors in verbal and pictorial analogies? Can verbal analogies be transformed into pictorial analogies and vice versa without change in factorial composition or loss of psychometric quality, e.g., reliability? Which of the two modes--verbal and pictorial--is the more "culture free" or "culture fair"? Is the same reasoning process used in both modes (Haynes et al., 1974)?

Because of the importance of these questions to a better understanding of analogical reasoning, a pictorial analogy study that paralleled the verbal analogy study was conducted. The first task was to develop a pool of pictures which were equivalent to words used in the construction of analogy items. Thus, a pool of picture-word equivalents was developed (Haynes et al., 1974). The next step was to develop a pool of picture pairs and to determine their REIs.

This report describes the development of the picture-pairs and the REI data collected for these picture pairs.

Method

Samples. The samples used in this study consisted of high school students (grades 9 through 12) from six high schools in Shelby County, Tennessee and three high schools in Tipton County, Tennessee.

Item Pool. The pictures used in this study were line drawings of common objects or events (Haynes et al., 1974). Many of the pictures were drawn to be picture-equivalents of words in a word pair list developed for use in this project (Dawis et al., 1974). A small number of pictures were drawn which did not represent words on this list. The picture pairs were developed from this pool of pictures. Many of the picture pairs were constructed to be equivalent to word pairs found in a previous report (Dawis et al., 1974b).

Instruments. Five picture booklets, each containing 100 different picture pairs, were constructed. Each of the five picture booklets was combined with each of ten defined relations to give fifty Picture Relation booklets, each identified by picture-relation combination. Each Picture Relation booklet contained a biographical data page, an instruction page, and five pages of picture pairs (100 pairs of pictures). Responses were recorded on separate answer sheets.

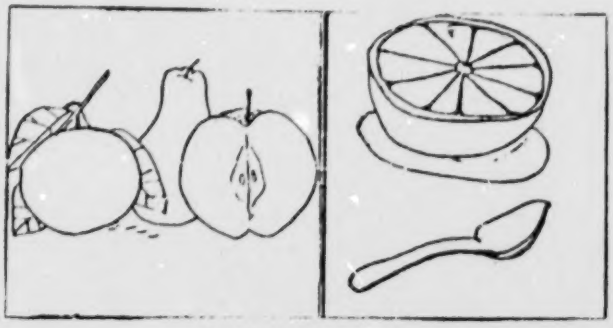
The instruction page, biographical data page, a sample picture page, and an answer sheet are included in the appendix.

The Relations. The relations used in this study include ten reported in an earlier study (Dawis et al., 1974b). The definitions and examples of the relations are given below.

1. Relation 1 (Class Member)

Two pictures have this relation when one picture represents a class which includes the other picture or both pictures are members of the same class.

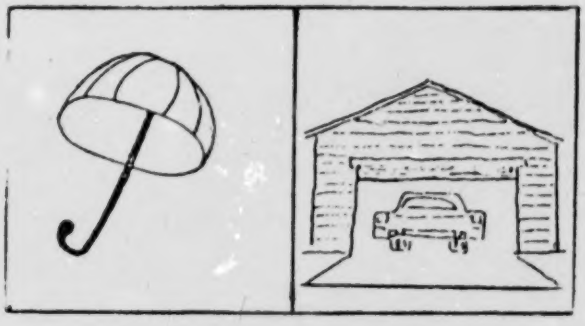
Example:



2. Relation 2 (Activity or Use)

Two pictures have this relation when both pictures represent objects that perform the same activity or have the same use.

Example:

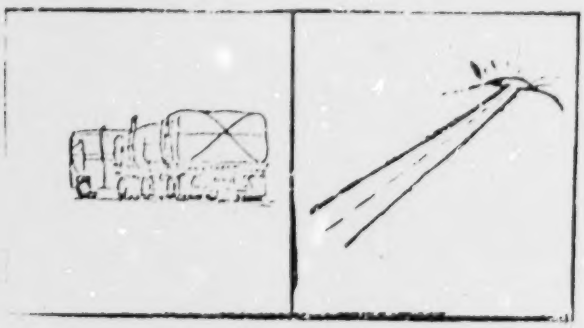


BEST COPY AVAILABLE

3. Relation 3 (Functional)

Two pictures have this relation when one picture represents an object that performs some activity on or for the object in the other picture.

Example:



4. Relation 5 (Conversion or Process)

Two pictures have this relation when one picture represents an object that was converted or processed from an object in the other picture.

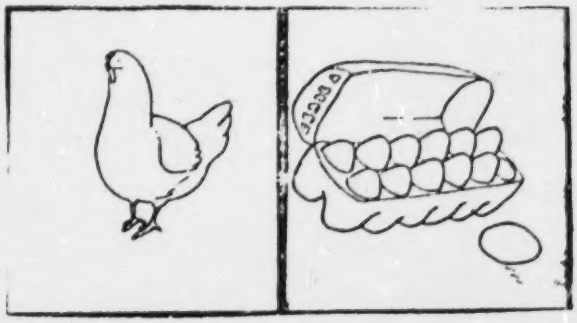
Example:

5. Relation 6 (Order or Time)

Two pictures have this relation when they represent events or objects which follow a certain temporal order.

Example:

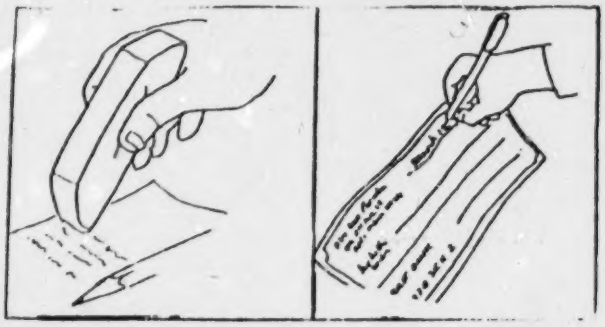
BEST COPY AVAILABLE



6. Relation 7 (Opposite)

Two pictures have this relation when they represent two opposing things.

Example:

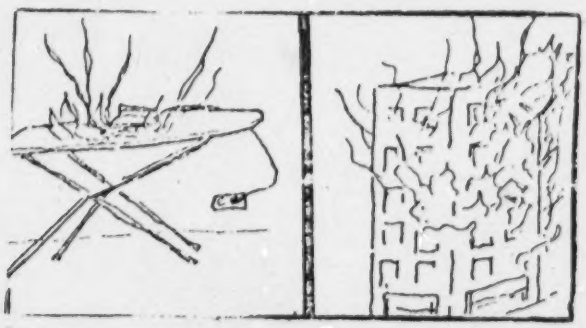


7. Relation 8 (Cause-effect)

Two pictures have this relation when one picture represents an object or event that causes or brings about the other object or event.

BEST COPY AVAILABLE

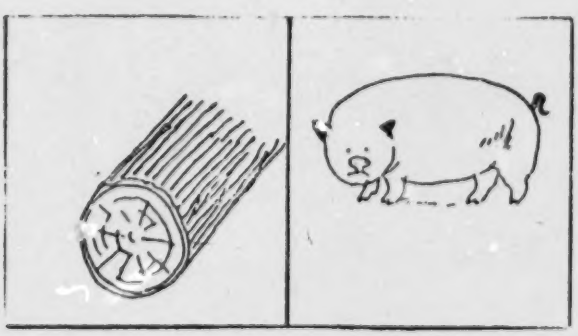
Example:



8. Relation 9 (Word Pattern)

Two pictures have this relation when they represent objects whose names sound like each other, or rhyme with each other, or is the other name spelled backward.

Example:



9. Relation 10 (Association)

Two pictures have this relation when the object in one picture is associated with the object of the other. The two objects are often thought of as going together.

Example:

BEST COPY AVAILABLE

10. Relation 14 (Worker-Tool/Product)

Two pictures have this relation if one picture represents a worker (a person or animal or thing) and the other represents a tool or product of its work.

Example:

BEST COPY AVAILABLE

Administration. With the generous cooperation of the Shelby County and Tipton County Boards of Education and the principals and counselors of the six Shelby County high schools, permission was obtained to use the entire high schools population for the study.

For logistic reasons it was necessary to engage the active participation of personnel in the office of the Shelby County and Tipton County Boards of Education as well as that of teachers and counselors in all schools. Before administering the instrument to the students, meetings were held with personnel of the Boards of Education to discuss the administration procedure thoroughly. Following this, meetings were held with teachers and counselors in their schools. During these meetings, the school personnel were familiarized with the instruments. Instructions for the administration procedure were thoroughly discussed. The instruments were distributed by personnel of the Boards of Education to the participating schools and administered to the students by the teachers and counselors.

Data Analysis. A total of 3,315 students participated in this study. However, students from two schools failed to fill out the biographical data page. Therefore the N for the Biographical data summary (Table 2) is 2,626. The analysis of the data was facilitated by the use of the computer program codebook from the SPSS (Statistical Package for the Social Sciences) system and a Fortran program developed to analyze the REI data in terms of the Chi Square statistic.

Results

Table 1 shows the number of students taking each of the Picture Relation exercises. The frequency distribution of the subjects on selected demographic variables is shown in Table 2. The remainder of this report shows the REI's for the 500 picture pairs and the ten relations.

Table 1

Number of Subjects Taking Each Picture Relation Exercise

Picture Booklets	Relations[a] 1	2	3	5	6	7	8	9	10	14	Totals
A	80	43	59		84		120	110	23	51	570
B	109	89	55	68	56	48	50	49		79	603
C	68	65		61	31	44	26		60	76	431
D	121	121	84	75	61	64	98	44	97	88	853
E	97	71	66	88	71	66	109	67	107	112	854
Totals	475	389	264	292	303	222	403	270	287	406	3311

Note: Empty cells indicate forms for which data were not collected.

[a]Relations:
1. Class Member
2. Activity/Use
3. Functional
5. Conversion/Process
6. Order/Time
7. Opposite
8. Cause-Effect
9. Word Pattern
10. Association
14. Work-Tool/Product

Table 2

Frequency Distribution of Tennessee Subjects
on Demographic Variables
(N=2626)

Variable		Frequency	Percent
1.	Grade in School		
	Grade 9	1178	44.9
	Grade 10	802	30.5
	Grade 11	396	15.1
	Grade 12	244	9.3
2.	School		
	Bartlett	372	14.2
	Bolton	165	6.3
	Collierville	1	.04
	Germantown	467	17.8
	Millington	1217	46.3
	Raleigh Egypt	39	1.5
	Covington	363	13.8
3.	Sex		
	Male	1225	46.6
	Female	1380	52.6
4.	Age		
	13	37	1.4
	14	642	24.4
	15	859	32.7
	16	671	25.6
	17	309	11.8
	18	67	2.6
	19	10	.4
	20	1	.04
	21	1	.04
5.	Race		
	Afro-American	736	28.0
	Mexican American	21	.8
	American Indian	45	1.7
	Oriental American	28	1.1
	White	1733	66.0
	Other	25	1.0
6.	Number of Children in Family		
	1 to 3	1002	38.2
	4 to 6	1044	39.8
	7 to 9	338	12.9
	10 or more	154	5.9

Table 2 (cont'd)

Variable	Frequency	Percent
7. Annual Family Income		
$5,000 or less	383	14.6
$5,001 to $10,000	527	20.1
$10,001 to $15,000	542	20.6
$15,001 to $20,000	360	13.7
More than $20,000	295	11.2
8. Housing		
Owns House	1753	68.8
Rents House	651	24.8
Rents Apartment	69	2.6
Public Housing	114	4.3
9. Father's Education		
8th Grade or Less	468	17.8
Some High School	526	20.0
High School Graduate	846	32.[illegible]
Some College	261	9.[illegible]
B.A. Degree or Equivalent	189	7.2
Beyond B.A. Level	133	5.1
Other	40	1.5
10. Mother's Education		
8th Grade or Less	297	11.3
Some High School	635	24.2
High School Graduate	1112	42.3
Some College	228	8.7
B.A. Degree or Equivalent	148	5.6
Beyond B.A. Level	72	2.7
Other	28	1.1
11. Father's Occupation[a]		
Occupational Level 1	712	27.1
Occupational Level 2	209	8.0
Occupational Level 3	149	5.7
Occupational Level 4	152	5.8
Occupational Level 5	82	3.1
Occupational Level 6	216	8.2
Occupational Level 7	82	3.1
Occupational Level 8	343	13.1
Occupational Level 9	355	13.5

Table 2 (cont'd)

Variable	Frequency	Percent
12. Mother's Occupation[a]		
Occupational Level 1	258	9.8
Occupational Level 2	420	16.0
Occupational Level 3	238	9.1
Occupational Level 4	10	.4
Occupational Level 5	26	1.0
Occupational Level 6	44	1.7
Occupational Level 7	51	1.9
Occupational Level 8	10	.4
Occupational Level 9	54	2.1
Occupational Level 10	1360	51.8

[a]Occupational Levels are defined as follows:

1. Professional, technical, and managerial occupations (lawyers, doctors, teachers, engineers, writers and managers)
2. Clerical and sales occupations (typists, stenographers, salespersons and merchants)
3. Service occupations (domestic servants, barbers, protective servants and waiters)
4. Farming, fishery, forestry, and related occupations (farmers, foresters, hunters and fisherman)
5. Processing occupations (processors of chemicals, wood, metal, food and tobacco)
6. Machine trades occupations (machinists, printers and textile workers)
7. Bench work occupations (fabricators, assemblers, repairpersons)
8. Structural work occupations (metal fabricators, welders and construction workers)
9. Miscellaneous occupations (truck drivers, packers, loggers and graphic artists)
10. Housewife

Relation Eduction Index (percentage of subjects educing the relation)
for 500 Picture Pairs and 10 Relations for Senior High School Students

(N ≥ 20 per cell)

Picture Pairs	Relations[a] 1	2	3	5	6	7	8	9	10	14
1. Teacher : Book	94	98	95		96		62	21	96	98
2. Fire hose : Fire hydrant	94	95	97		89		52	21	100	90
3. Umbrella : Tent	35	86	21		28		7	6	17	18
4. Nail : Mouse hole	6	7	16		16		17	50	9	8
5. Lion : Tiger	96	93	79		88		37	16	83	76
6. Cutting wood : Logs	91	70	98		87		58	21	100	94
7. Mitten : Kitten	13	9	14		16		8	96	26	16
8. Tree : Man	4	16	10		17		13	10	4	16
9. Hammer : Anvil	69	72	66		71		31	23	43	65
10. Glass of ice water : Beer mug	94	95	76		86		39	22	83	74

[a]Relations

1. Class Member
2. Activity/Use
3. Functional
5. Conversion/Process
6. Order/Time
7. Opposite
8. Cause-Effect
9. Word Pattern
10. Association
14. Worker-Tool/Product

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
11. Germs : Cell	86	91	81		80		72	52	87	84
12. Cowboy : Lasso rope	84	60	95		95		58	23	96	100
13. Magnifying glass: Microscope	92	88	79		92		66	32	74	82
14. Tailor : Material cloth	89	74	88		80		53	28	91	86
15. Eat : Bread	45	56	66		65		40	23	65	59
16. Screws : Screwdriver	89	77	98		94		73	53	96	90
17. Owl : Cat	20	26	21		19		8	9	13	16
18. Hands : Marriage	75	81	81		83		82	47	83	82
19. Roof : Room	36	30	50		40		30	20	13	33
20. Fall : Winter	62	58	59		77		64	32	57	69
21. Chef : Turkey	75	67	79		89		67	21	65	67
22. Jar : Car	9	12	12		8		8	88	4	10
23. Socket : Plug	93	74	98		98		77	33	100	90
24. Fireman : Fire	94	74	93		95		42	47	91	96
25. Room : Floor	54	56	32		59		33	21	30	39
26. Saw : Log	81	70	91		90		64	25	96	88
27. Tire : Fire	6	5	5		12		8	73	4	6
28. Lock : Key	96	79	97		94		78	19	96	92

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
29. Egg : Ball	9	9	17		16		13	13	13	14
30. Milk : Water	66	79	53		59		21	12	64	47
31. Pen : Hen	9	5	7		12		9	57	0	12
32. Conductor : Violin	89	79	90		94		74	25	96	98
33. Flowerbud : Flower	95	95	83		93		85	40	100	86
34. Man : Map	22	33	49		43		35	14	30	29
35. Sugar : Lemon	15	51	24		27		18	11	4	14
36. Rope : String	81	67	70		78		38	26	74	69
37. Film : Camera	93	76	95		93		61	29	91	88
38. Square : Circle	24	33	14		16		14	4	13	24
39. Oil : Race car	85	74	91		90		76	25	91	92
40. Compass : Steering wheel	18	28	28		34		22	17	18	22
41. Desert : City	17	21	28		33		34	9	17	27
42. Fire : Fire extinguisher	90	67	98		88		67	41	96	90
43. Tractor : Plow	91	98	89		87		53	32	87	86
44. Elephant : Piano	15	14	26		40		18	6	13	33
45. Scarf : Gloves	99	100	98		90		69	27	100	88
46. Mouse : Cheese	86	72	91		94		52	20	100	94

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
47. Fruit : Orange	98	95	72		82		39	27	87	78
48. Hoof : Horse	74	81	69		77		49	28	65	70
49. Bow and arrow : Rifle	72	93	48		73		48	17	35	57
50. Scarf : Bikini	5	16	14		24		13	9	9	12
51. Beer : Drink	89	91	90		82		61	27	91	76
52. Goat : Milk	55	70	66		71		66	19	57	67
53. Paper clip : Paper	76	63	88		87		50	37	87	86
54. Cigarette : Coffin	47	37	45		50		54	16	52	53
55. Book : Bible	80	84	71		79		47	40	74	80
56. Wrench : Pliers	91	100	90		83		89	34	91	82
57. Bread : Toast	98	84	97		89		81	47	100	86
58. Car : Boat	36	77	37		46		16	12	35	27
59. Weather vane : Compass	77	70	78		72		67	40	70	67
60. Bow : Bow	31	26	32		35		24	47	30	31
61. Bird : Alligator	32	30	10		22		6	16	13	14
62. Bullet : Rifle	84	67	91		92		55	23	91	84
63. Operator : Telephone	96	91	95		96		74	38	96	100
64. Bow : Hair	74	51	86		82		42	28	86	80

		Relation								
	Picture Pair	1	2	3	5	6	7	8	9	10	14
65.	Nurses : Crutch	81	79	88		89		54	24	87	90
66.	Snow : Igloo	89	77	84		88		64	29	83	82
67.	Drink : Water	65	86	60		58		21	27	61	51
68.	Carrot : Orange	47	53	29		28		20	13	17	30
69.	Yarn : Sweater	94	65	95		89		75	28	91	92
70.	Hammer : Anvil	85	79	69		72		21	20	70	69
71.	Bubble gum : Ice cream	36	56	28		41		24	16	22	25
72.	Cup : Saucer	88	79	86		84		77	33	68	67
73.	Comb : Hair	91	72	95		93		58	29	100	98
74.	Tadpole : Frog	94	84	93		90		84	41	91	84
75.	Sea Captain : Ship	93	86	95		87		58	32	96	96
76.	Dock : Lock	7	12	12		16		11	54	4	2
77.	Flower Bed : Flower	99	91	95		93		65	48	96	94
78.	Sweater : Coat	94	100	74		83		52	21	70	71
79.	Meat : Ham	94	93	84		86		40	41	78	80
80.	Janitor : Cleaner woman	92	93	83		84		50	37	83	76
81.	Jail : Sail	11	7	14		22		8	45	13	8
82.	Beaver : Cleaver	9	19	17		19		13	22	9	20

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
83. Spring : Fall	28	37	31		35		28	14	17	33
84. Rain : Sprinkler	85	88	84		70		44	32	78	71
85. Jail : Mouse hole	13	16	14		29		22	34	0	24
86. Draftsman : Ruler	86	72	86		84		61	23	87	84
87. Mannequin : Material cloth	89	74	91		84		57	32	100	90
88. Door : House	91	77	91		83		53	28	91	78
89. Dice : Rice	9	12	21		14		10	74	13	10
90. Cheese : Cat	57	63	67		66		47	21	65	61
91. Bed : Sleep	96	95	93		92		78	36	100	90
92. Coffee : Tea	75	77	57		58		47	33	50	47
93. Pick : Wick	18	19	18		31		14	20	13	18
94. Butter : Knife	85	67	90		88		61	28	87	88
95. Plumber : Pipe	67	56	67		70		35	20	70	69
96. Seal : Reel	15	14	16		18		10	50	4	18
97. Flagman : Radar scope	68	67	63		60		41	28	43	59
98. Bread : Eat	68	65	66		67		53	19	57	61
99. Pail : Nail	11	12	16		20		8	57	13	10
100. Lock : Door	96	77	95		82		72	34	96	88

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
101. Bow : Arrow	96	88	100	79	96	83	58			91
102. Dog : Puppy	92	79	87	87	85	73	78			91
103. Spoon : Soup can	75	73	85	56	69	71	38			83
104. Slide rule : Numbers	83	83	85	79	67	75	55			67
105. Carpenter : Hammer	96	96	92	84	82	85	51			88
106. Calf : Cow	94	82	96	90	92	79	81			89
107. Cane : Sugar cane	36	42	34	31	40	40	32			33
108. Bucket : Jail	14	24	8	6	15	11	14			16
109. Pistol : Bow	49	65	32	19	38	44	21			32
110. Pig : Ham	94	91	98	96	88	88	84			92
111. Owl : Ant	19	21	15	3	15	15	13			14
112. Astronaut : Moon	86	81	92	86	77	77	65			84
113. Push : Pull	86	72	72	59	67	73	55			72
114. Tire : Wheel	97	92	83	77	79	83	61			82
115. Rain : Umbrella	86	70	94	74	94	85	80			82
116. Spider : Fly	78	76	58	36	42	60	36			63
117. Fire : Smoke	77	67	77	73	83	67	74			71
118. Mittens : Glove(s)	93	97	75	71	83	83	51			80

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
119. Bone : Telephone	8	8	6	9	15	10	0			9
120. Shoe : Shirt	70	74	62	29	48	70	29			58
121. Roof : House	88	88	87	74	87	81	63			84
122. Tree : Rake	78	70	87	69	90	73	75			81
123. Fruit : Nut	60	81	57	43	58	56	42			59
124. Camera : Photo	94	85	98	97	94	88	94			92
125. Ball : Baseball bat	92	92	89	63	83	77	63			83
126. Line : Pine tree	73	64	74	59	69	63	48			57
127. Steering wheel : Car	94	87	98	81	88	83	63			85
128. Beans : Coffee	74	74	73	73	69	65	71			65
129. Dime : Dollar	96	94	85	84	87	90	76			88
130. Bubble gum : Ice cream	35	30	24	26	29	29	25			29
131. Football player : Football	96	91	94	76	85	85	55			84
132. Cigarette: Cigarette (butt)	89	82	77	84	90	85	77			75
133. Snow : Rain	50	52	36	37	44	42	31			48
134. Spool of thread : Tire	12	20	11	13	23	10	10			19
135. Fish hook : Fish	94	79	94	71	90	85	73			87
136. Boxer : Ring	94	84	91	81	92	85	67			80

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
137. Baby-birth : Coffin	39	35	38	40	54	44	40			43
138. Scissors : Hammer	27	37	19	20	25	27	10			25
139. Water : Glass	49	49	55	46	60	42	32			55
140. Farmer : Tractor	94	87	87	78	94	83	82			85
141. Barn : Yarn	13	21	17	19	15	19	21			21
142. Fire extinguisher : Fire hose	91	88	81	79	83	81	67			87
143. Corn : Bread	44	59	57	64	38	40	63			51
144. Window : Port hole	63	61	55	37	52	50	24			53
145. Bottle (wine) : Cheese	39	35	31	26	25	19	21			23
146. Chair : House	47	52	40	47	52	38	37			49
147. Desk : Chair	87	84	87	66	92	78	58			84
148. Sewing machine : Needle	96	92	91	81	88	88	67			83
149. Sheriff : Handcuffs	85	78	87	59	83	67	53			76
150. Sea captain : binoculars	90	91	89	87	85	88	67			83
151. Jail : Mouse hole	14	20	23	27	23	17	27			33
152. Pilot : Jet	94	92	96	89	90	90	82			87
153. Cat : Dog	59	49	34	27	38	43	27			29
154. Butter : Eat	46	54	58	44	46	38	44			47

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
155. Hand clasp : Argue	41	36	40	50	41	48	54			47
156. Cards : Dice	84	90	70	67	73	75	56			72
157. Cobbler : Shoe	95	84	92	87	85	89	96			92
158. Drums : Cymbals	95	94	81	69	85	77	55			81
159. Arm : Farm	19	13	25	19	23	11	32			28
160. Bed : Bedroom	96	91	81	81	90	85	76			83
161. Argue : Baseball	90	80	74	67	90	88	67			84
162. Egg : Bird	40	36	32	39	23	31	38			40
163. Knife : Axe	85	82	72	50	59	71	47			69
164. Skiis : Snow	89	84	85	76	83	83	67			75
165. Tank : Rifle	88	93	81	61	79	77	51			81
166. Knife : Cheese	63	57	83	64	69	58	65			69
167. Diamond : Square	15	15	26	16	13	19	18			19
168. Mop : Police	8	6	13	13	13	9	10			15
169. Match flame : Candle	93	93	94	93	88	92	90			91
170. Mailman : Letter	96	91	94	90	92	85	84			88
171. Knife : Fork	96	92	81	66	81	92	57			76
172. Pick : Guitar	76	74	74	59	71	73	63			68

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
173. Ring : Wing	19	23	14	14	27	11	17			20
174. Telephone : Operator	94	96	91	87	87	85	91			83
175. Butterfly : Grass	32	27	32	31	27	23	35			33
176. Cow : Milk	94	97	92	90	92	90	90			89
177. House : Mousetrap	94	82	91	73	86	90	77			77
178. Radar scope : Airplane	83	78	81	69	87	79	69			73
179. Oar : Door	13	11	11	6	14	15	15			10
180. Preacher : Bible	95	98	94	83	83	90	76			87
181. Bull : Cow	89	78	77	61	65	77	49			75
182. Elephant : Horse	45	34	13	13	25	23	23			32
183. Hammer : House	60	47	77	57	65	50	75			67
184. Dog : Bone	89	90	89	80	90	83	73			80
185. Match flame : Fire	94	98	91	91	92	83	88			83
186. Hose : Fire	10	8	11	13	18	13	13			20
187. Room : Chair	59	72	58	46	63	43	36			61
188. Sunrise : Sunset	79	81	74	87	83	71	73			65
189. Face : Motorcycle racer	33	31	36	36	38	21	30			39
190. Leaf : Cabbage	55	64	47	43	60	50	50			49

		Relation									
	Picture Pair	1	2	3	5	6	7	8	9	10	14
191.	Hockey stick : Baseball bat	64	61	45	37	44	48	27			57
192.	Seed : Flower	71	73	64	76	54	58	75			62
193.	Lifeguard : Pool	73	60	77	60	65	71	56			71
194.	Snow : Toboggan	70	76	72	59	77	67	63			65
195.	Pull : Bull	15	14	17	11	19	13	13			12
196.	Eskimo : Igloo	92	95	91	89	92	88	88			89
197.	Lawn mower : Grass	84	81	92	67	78	81	80			84
198.	Vacuum cleaner : Mop	88	78	67	63	69	77	52			59
199.	Sailor : Potato	20	15	19	10	19	15	25			20
200.	Square : Line	44	44	40	42	21	33	37			29
201.	Match-flame : Catch (football)	14	5		3	4		16		12	9
202.	Bow : Violin	88	94		90	85		64		90	91
203.	City : Farm	75	89		73	80		36		65	55
204.	Puppy : Dog	95	88		97	88		72		98	91
205.	Lumber : Paper	74	70		80	61		76		66	71
206.	Hand : Fingers	95	89		93	84		68		100	99
207.	Cheese : Mouse	77	80		82	83		92		93	76
208.	Director : Actor	86	83		75	65		50		69	65

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
209. Boy : Dog	17	20		13	15		12		15	17
210. Hammer : Nail	87	87		82	86		56		97	96
211. Coat : Goat	16	16		21	12		20		10	16
212. Eraser : Paper	75	69		75	61		56		78	72
213. Sheep : Material-cloth	70	70		82	71		84		75	73
214. Bowl : Plate	92	88		80	79		68		95	75
215. Skiis : Toboggan	72	78		70	65		36		75	59
216. Sheep : Farmer	59	54		46	43		32		62	72
217. Falling rain : Rake	63	77		70	89		76		72	75
218. Astronaut : Rocket	90	86		93	89		72		95	91
219. Owl : Scholar	20	31		22	29		16		22	20
220. Tape Measure : Ruler	94	97		93	88		72		100	80
221. Needle : Button	89	81		80	73		72		92	86
222. Barber : Scissors	88	91		92	83		76		98	80
223. Fruit : Apple	95	91		80	80		56		93	78
224. Baby-birth : Face	45	47		48	43		52		40	39
225. Submarine : Bus	48	66		48	39		12		33	36
226. Nurse : Blood	77	79		87	76		88		92	78

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
227. Fly : Fruit	14	6		21	17		16		8	26
228. Spoon : Fork	100	94		85	89		60		95	72
229. Boy : Man-walking	84	82		92	67		68		82	84
230. Carrot : Canoe	9	6		7	1		4		5	5
231. Cabbage : Ham	47	60		30	27		24		52	39
232. Dog : Pig	51	48		30	17		12		28	26
233. Jewelry : Ring	92	95		90	78		48		98	76
234. Sailor : Mop	56	50		54	49		44		57	68
235. Cheese : Cheese	97	95		93	89		88		98	83
236. Chair : Stool	94	94		80	84		64		95	72
237. Shovel : Spade	94	95		87	83		76		98	75
238. Roots : Leaf	67	72		79	69		60		70	70
239. Breast : Wing	80	78		70	67		72		78	74
240. Mouse : House	37	31		38	24		28		37	36
241. Carpenter : Saw	92	98		90	87		88		98	93
242. Lamp : Desk	75	75		69	66		52		81	68
243. Chicken : Egg	98	92		100	96		92		98	92
244. Fish : Dish	8	20		15	15		12		7	14

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
245. Doctor : Nurse	94	91		93	84		56		95	80
246. Leaf : Tea	53	58		54	57		84		47	55
247. Barber : Hair	72	69		67	64		48		82	63
248. Comb : Lawn Mower	11	16		3	5		12		2	12
249. Monkey : Donkey	42	48		25	21		16		28	28
250. Coal : Fire	45	66		51	55		64		58	36
251. Fishing Rod : Reel	92	92		89	79		80		95	88
252. Egg : Chick	83	86		84	83		84		77	82
253. Horse : Bull	52	49		33	27		16		32	21
254. Gun Barrel : Rifle	88	94		89	84		80		100	75
255. Window : House	92	82		90	83		68		97	86
256. Rifle : Pistol	95	95		79	85		48		87	74
257. Mousetrap : Mouse	91	81		89	83		64		93	82
258. Witch : Robin Hood	23	29		15	11		12		5	14
259. Police : Nightstick	89	87		90	81		80		97	88
260. Bow (hair) : Bow (violin)	19	19		15	13		16		8	14
261. Sail : Mouse Hole	11	8		10	7		16		3	8
262. Lens : Camera	94	89		95	89		76		98	91

		Relation								
	Picture Pair	1	2	3	5	6	7	8	9	10	14
263.	Butterfly : Flower	81	75		77	75		72		81	76
264.	Light Bulb : Lamp	97	95		95	87		84		97	95
265.	Butterfly : Birds	33	44		21	23		4		14	24
266.	Road : Car	86	87		84	88		68		95	87
267.	Priest : Pray	64	66		70	57		56		75	70
268.	Helicopter : Airplane	89	95		77	81		48		92	66
269.	Cow : Steak	81	92		100	93		92		97	88
270.	Rake : Cake	6	6		0	0		4		2	9
271.	Target : Circle	55	60		62	51		40		68	45
272.	House : Cat	37	44		32	30		40		45	39
273.	Trombone : Trumpet	94	97		80	84		64		98	70
274.	(Tennis)racket : Jacket	22	18		11	19		20		24	28
275.	Sheriff : Jail	66	65		64	67		58		67	74
276.	Motorcycle : Bicycle	86	89		80	82		60		92	66
277.	Fire : Smoke	53	49		52	47		32		49	43
278.	Camel : Donkey	63	81		38	43		28		61	39
279.	Fire hose : Toes	13	10		3	4		8		5	13
280.	Grasshopper : Kangaroo	38	43		21	36		28		34	28

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
281. Chemist : Microscope	86	87		87	83		68		98	88
282. Tree : Lumber	83	85		84	83		100		88	67
283. Clothes rack : shirt	92	98		97	89		80		100	82
284. Rocket : Astronaut	94	87		90	93		76		97	87
285. Train: Rain	14	13		11	11		12		5	12
286. Salt shaker : Pepper	89	92		82	81		56		98	71
287. Lamp : House	65	59		56	56		32		70	54
288. Fuel : Train	72	62		59	60		75		71	71
289. Microscope : Cell	84	87		92	89		92		98	84
290. Paddle : Cow	13	15		8	15		16		13	20
291. Net : Fish	68	63		70	73		52		87	69
292. Pencil : Typewriter	70	84		59	71		44		63	53
293. Airplane : Submarine	55	62		39	39		28		30	38
294. Owl : Cow	33	21		20	11		24		18	17
295. Beaver : Beaver dam	58	67		62	64		64		78	63
296. Tea : Drink	62	78		61	52		28		67	50
297. Fire truck : Fire	84	86		89	88		76		97	82
298. Bread : Meat	66	81		48	59		28		68	45

	Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
299.	Bullfight-matador : Bull	92	89		93	81		83		98	84
300.	Artist : Picture painting	84	81		93	85		84		93	84
301.	Capitol : Comb	21	21	20	22	23	21	20	68	12	25
302.	Baby : Boy	83	74	71	75	77	71	81	45	84	73
303.	Peasant : Rice	65	56	73	64	72	40	65	46	72	67
304.	Box : Jar	70	80	36	40	42	44	30	43	38	51
305.	Soldier : Rifle	82	82	95	72	84	47	52	53	90	92
306.	Spoon : Moon	19	13	5	9	16	21	13	70	12	14
307.	Peanut : Potato	86	85	77	76	79	63	61	60	64	89
308.	Sea : Wave	77	57	79	65	72	52	56	48	81	60
309.	Scissors : Cloth	70	72	87	75	86	60	72	30	80	80
310.	Tennis : Tennis Court	66	59	72	57	70	51	46	55	73	67
311.	Shirt : Tie	90	97	98	81	95	57	62	30	96	80
312.	Cloud (Bomb) : Rain	28	36	51	40	37	46	48	46	42	35
313.	Spade : Spade	50	33	28	39	30	48	31	63	19	33
314.	Perfume bottle : Skunk	53	54	43	38	30	70	39	58	35	38
315.	Farm : Barn	87	83	81	87	84	46	70	69	96	85
316.	Train : Track	91	89	90	88	93	59	29	48	97	87

	Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
317.	Paper : Pencil	89	89	90	76	86	65	52	57	93	80
318.	Submarine : Ship	87	92	63	79	77	69	58	59	89	75
319.	Milk : Butter	86	83	81	84	89	56	51	51	81	87
320.	Spider : Spider web	90	87	96	92	96	52	90	44	97	92
321.	Shovel : Mop	33	37	17	28	21	32	19	41	39	29
322.	Farmer : Plow	72	57	86	62	75	49	52	54	87	90
323.	Pail : Sail	18	20	13	20	30	24	15	48	25	13
324.	Lumber : Arrow	23	26	17	30	18	25	43	46	22	27
325.	Oar : Bicycle	20	34	14	21	5	31	14	47	23	20
326.	Numbers : Number	92	92	87	80	88	40	71	56	94	86
327.	Log : Dog	15	18	16	15	16	23	16	78	10	16
328.	Banjo : Guitar	93	95	76	80	95	62	73	42	96	80
329.	Janitor : Pail	82	83	92	85	82	35	53	62	93	84
330.	Film : Photo	90	70	82	79	89	63	86	23	75	86
331.	Bow (archery) : Bow (hair)	31	17	20	23	18	52	20	72	19	20
332.	Sugar cane : Sugar	86	80	84	77	89	61	80	65	84	89
333.	Cat : Mouse	59	54	64	44	55	60	38	43	59	61
334.	Tree : Tree without leaves	93	91	78	91	89	76	82	47	93	81

	Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
335.	Battery : Flashlight	72	60	81	68	79	38	66	54	64	78
336.	Train : Airplane	68	76	33	53	53	53	43	69	63	46
337.	Cloth : Shirt	72	55	72	69	79	52	73	25	75	63
338.	Porthole : Ship	67	52	67	69	69	39	43	25	73	61
339.	Grass : Hair	13	14	11	16	9	17	13	23	8	13
340.	Axe : Tree	54	49	80	56	59	51	36	51	78	63
341.	Indian : Arrow	88	86	94	83	91	54	69	44	93	97
342.	Desert : Snow	28	45	23	24	32	56	22	42	38	30
343.	Key : Keyhole	93	83	98	81	91	67	83	57	98	90
344.	Match(flame) : Cigarette	83	84	89	81	91	49	92	54	94	91
345.	Blimp : Helicopter	77	76	50	71	70	48	47	23	65	55
346.	Umbrella : Rain	91	61	96	77	86	52	61	42	99	78
347.	Galaxy : Star	77	61	66	79	75	43	60	46	69	65
348.	Cones : Pine Tree	30	28	24	32	25	30	26	46	19	26
349.	Bible : Praying hands	87	88	95	87	93	51	87	49	95	85
350.	Ham : Dam	18	6	7	4	9	24	5	58	7	13
351.	Piggy bank : Tank	19	13	12	11	19	24	18	48	8	20
352.	Ear : Bald head	88	83	92	84	82	41	62	58	93	80

	Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
353.	Spider : Dog	14	20	5	15	7	17	13	23	11	16
354.	Bus : Apartment	22	29	27	23	32	33	18	21	28	26
355.	Garage : Car	87	69	89	87	91	57	66	39	98	85
356.	Celery : Carrot	92	87	59	61	61	49	46	51	80	63
357.	Branch : Tree	86	88	87	89	96	54	78	61	95	87
358.	Acorn : Pine Tree	45	38	29	36	42	44	30	40	42	28
359.	Snail : Turtle	66	71	39	51	35	35	33	28	63	37
360.	Boy : Girl	70	66	61	64	72	68	57	57	75	64
361.	Football catch : Football helmet	91	88	94	91	91	51	72	55	97	93
362.	Cat : Tiger	94	89	64	71	72	63	61	37	85	72
363.	Sheep : Dog	45	50	52	26	32	29	28	33	41	40
364.	Eggs : Chicken	94	92	95	88	86	62	86	53	99	90
365.	Oar : Rowboat	93	88	96	85	91	49	68	58	96	82
366.	Penny : Dollar	91	93	82	84	93	75	82	46	93	84
367.	Nail : Jail	38	30	35	32	33	25	40	26	37	37
368.	Wolf : Sheep	58	42	59	48	54	46	35	30	53	41
369.	Cleaning Woman : Broom	88	80	92	80	89	49	71	55	88	88
370.	Pocketknife : Knife	91	92	63	75	84	53	54	74	92	78

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
371. Lion : Sheep	35	32	22	25	18	37	16	33	22	20
372. Rollerskate : Bicycle	66	81	47	55	46	44	41	44	63	38
373. Justice : Jail	29	18	14	21	16	19	22	33	16	27
374. Light attachment : Camera	90	91	65	87	88	51	67	72	85	74
375. Scissors : Razor	54	79	41	41	58	51	45	28	67	50
376. Corn field : Corn kernels	97	86	94	88	95	49	93	71	94	87
377. Apple : Orange	93	87	58	60	65	49	44	54	76	64
378. Tea : Three	17	13	9	16	11	24	18	60	7	19
379. Kitten : Puppy	72	70	60	68	47	70	51	32	68	52
380. Eggs : Leg	21	8	7	12	11	21	20	71	10	20
381. Arguing : Statue	59	53	48	51	58	78	51	42	62	44
382. Mine worker : Coal	72	65	76	73	74	41	76	30	76	77
383. Bat : Dracula	82	85	78	74	84	67	72	39	89	77
384. Tailor : Scissors	87	82	96	88	89	51	56	58	93	83
385. Track : Road	72	76	44	57	58	67	51	52	61	55
386. Grass : Cows	53	50	70	48	63	29	51	27	67	57
387. Cat : Mice	62	52	70	57	56	59	43	48	66	63
388. Stamp : Lamp	17	11	5	12	16	15	18	64	9	12

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
389. Bow : Banjo	45	44	24	35	32	35	33	34	40	33
390. Bread : Butter	76	86	90	65	72	65	57	38	92	73
391. Police : Jail	71	72	66	68	61	47	70	37	70	73
392. Carpenters : House	86	70	92	85	93	54	85	48	86	85
393. Hourglass : Watch	92	85	73	87	89	57	77	58	95	73
394. Milk : Milk	93	86	92	87	95	48	87	60	95	87
395. Moth : Cloth	28	18	20	23	26	29	20	36	16	27
396. Bow & Arrow : Fishing Rod	42	47	33	24	28	32	29	49	36	31
397. Column : Capital	73	71	81	73	74	40	72	52	75	78
398. Smile : Sad	72	64	50	63	75	73	58	47	72	53
399. Mountain : Goat	75	58	82	71	68	35	58	30	72	58
400. Blacksmith : Horse	74	65	74	72	74	46	60	30	74	74
401. Tennis court : Racket	84	72	89	72	86	83	36	46	81	77
402. Feet : Foot	82	82	65	81	73	43	41	41	94	70
403. Statue : Baby	84	61	80	86	89	81	84	44	75	86
404. Bullet : Arrow	33	65	42	47	45	38	24	25	23	38
405. Coffee cup : Coffee	87	82	95	74	75	86	40	55	87	81
406. Hammer : Saw	83	86	65	56	54	68	20	27	82	54

		Relation									
	Picture Pair	1	2	3	5	6	7	8	9	10	14
407.	Rain : Cane	9	11	18	9	14	14	14	78	5	12
408.	Sea : Fish	84	69	74	71	69	69	51	36	69	68
409.	Fireman : Fire extinguisher	92	92	85	79	77	69	61	53	95	91
410.	Leaf : Tree	95	93	94	93	90	83	67	55	99	89
411.	Grapes : Wine bottle	85	86	88	93	94	55	85	44	85	94
412.	Plow : Tractor	95	94	85	71	89	79	58	50	95	77
413.	Guitar pick : Violin	18	35	18	13	11	24	9	12	15	15
414.	Carriage : Car	95	93	86	87	96	88	78	72	93	75
415.	Square : Box	35	37	42	47	59	50	52	33	29	48
416.	Cow : Milk	93	94	97	98	96	88	92	67	95	97
417.	Caterpillar : Butterfly	95	87	91	97	92	77	90	53	92	89
418.	Eating : Drinking	57	49	47	33	50	66	29	27	49	37
419.	Lettuce : Cabbage	79	89	77	81	69	81	58	47	79	70
420.	Rain : Water	75	82	74	78	83	62	68	58	67	68
421.	T.V. : Radio	82	86	68	67	45	82	36	30	72	55
422.	Door : Car	11	17	8	1	10	17	10	19	9	9
423.	Comb : Brush	88	94	94	76	75	91	57	47	92	68
424.	Stamp : Letter	93	83	94	84	87	86	76	47	94	89

	Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
425.	Jack : Car	73	66	94	55	85	74	39	34	78	85
426.	Paper bag : Box	55	82	48	53	46	58	26	39	58	34
427.	Traffic : Policeman	74	54	86	62	82	66	72	36	76	92
428.	City : Building	96	87	74	84	79	78	58	55	90	75
429.	Rake : Tree	67	65	91	57	70	75	42	47	77	87
430.	Ashtray : Cigarette	86	77	92	71	83	84	47	55	93	81
431.	Pistol : Sun	4	15	5	3	8	12	2	72	2	5
432.	Corn kernels : Horse	35	41	38	30	39	31	25	25	48	40
433.	Compass : Compass	66	69	58	48	54	42	45	38	65	62
434.	Farmer : Corn	76	69	83	77	82	45	76	38	70	95
435.	Kitten : Cat	98	92	94	95	93	86	74	63	93	88
436.	Nail : Sail	12	19	18	17	24	22	17	50	12	22
437.	Mountain : Hill	88	90	77	89	81	75	63	53	89	71
438.	Bald : Hair	77	78	76	78	79	89	56	50	71	72
439.	Horse : Buggy	70	87	77	63	79	77	58	38	73	76
440.	Book : Chef	63	66	62	62	68	48	53	61	63	65
441.	Doctor : Stethescope	94	86	94	71	76	66	64	48	92	90
442.	Ship : Building	2	11	9	3	8	20	8	11	1	8

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
443. Log : Hog	9	11	3	2	8	25	7	94	3	8
444. Rock : Lock	7	7	8	10	14	17	13	89	4	13
445. Tree : Leaves Falling	84	85	91	83	71	83	64	43	75	67
446. Door : Window	65	68	61	57	44	71	31	24	60	41
447. Butter : Meat	55	76	64	47	42	46	31	21	63	51
448. Elbow : Arm	96	93	85	85	92	82	79	46	92	72
449. Hunter : Gun	95	92	95	70	77	82	58	46	95	91
450. Sun : Moon	73	89	71	71	83	73	64	19	81	70
451. Sail : Sailboat	83	94	91	87	89	74	66	56	94	75
452. Butterfly : Moth	82	80	65	66	49	80	38	41	75	55
453. Cap : Jacket	55	75	58	48	54	52	36	21	58	53
454. Tire : Car	91	87	95	71	90	75	63	38	90	89
455. Gum : Drum	7	7	2	5	6	22	7	78	6	9
456. Haystack : Meat	13	21	12	16	33	22	26	32	21	21
457. Cup : Glass	88	94	71	68	68	83	40	45	88	63
458. Milk : Cheese	91	86	89	91	85	71	74	35	82	85
459. Blacksmith : Anvil	86	65	80	53	72	52	66	39	78	76
460. Seals : Wheel	8	10	3	7	13	11	7	81	5	7

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
461. Cheese : Sandwich	64	82	79	78	70	68	64	33	69	76
462. Rock : Dock	9	13	5	3	14	15	8	58	4	5
463. Wick : Candle	80	82	76	87	84	94	75	47	71	83
464. Teller : Piggy bank	87	92	85	78	79	75	59	70	86	83
465. Biplane : Jet	96	94	82	89	94	86	84	64	95	78
466. Train : Car	44	70	35	40	34	46	14	19	40	26
467. Dock : Rowboat	72	82	88	62	74	65	54	41	81	82
468. Sun : Rain	41	41	38	45	55	54	36	28	35	49
469. Light switch : Chandelier	81	76	77	79	82	50	71	53	84	83
470. Sea : Sailboat	80	68	94	59	80	74	55	42	88	85
471. Lemon : Orange	85	86	61	64	61	73	45	27	78	59
472. Broom : Room	33	25	53	43	56	30	40	31	29	56
473. Lawyer : Justice	51	52	53	45	42	42	34	29	37	52
474. Mop : Floor	77	63	92	64	77	62	73	41	83	87
475. Corn : Horn	10	8	3	8	11	22	4	71	2	6
476. Binoculars : Telescope	92	93	86	80	87	78	81	51	95	82
477. Doorknob : Door	86	93	91	82	80	77	60	52	86	82
478. Pencil : Pen	89	93	74	66	79	91	60	52	93	67

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
479. Blacksmith : Cobbler	50	72	55	45	49	63	36	40	46	42
480. Sewing machine : Cloth	80	70	86	70	87	85	56	33	83	85
481. Penny : Dime	89	94	83	83	82	82	64	45	89	75
482. Roller skate : Broken arm (sling)	38	18	48	55	56	28	61	30	24	52
483. Club : Spade	54	55	42	40	60	77	39	39	49	43
484. Gum : Cup	9	7	14	7	14	15	7	31	8	9
485. Engineer : House	76	79	82	69	80	63	75	41	75	85
486. Bat : Bat	27	31	24	15	20	35	12	86	5	13
487. Broom : Mop	96	94	77	67	77	81	64	33	91	70
488. Cane : Crutch	89	92	82	80	85	68	63	39	97	72
489. Teller : Dollar	83	68	86	76	89	77	67	44	88	92
490. Cowboy : Indian	71	61	74	55	67	73	30	38	57	60
491. Sheep : Yarn	73	80	80	83	87	54	75	40	70	87
492. Cat : Dog	55	65	47	33	38	65	15	27	38	33
493. Doctor : Lawyer	19	10	12	13	7	32	17	30	10	16
494. Policeman : Police car	92	85	97	70	87	69	77	55	95	94
495. Chandelier : Lamp	95	97	85	72	79	85	67	52	94	72
496. Cobbler : Dollar	16	18	33	39	44	29	43	22	12	30

Picture Pair	Relation 1	2	3	5	6	7	8	9	10	14
497. Bass Violin : Violin	93	96	77	78	76	83	59	64	97	71
498. Artist : Canvas	86	80	88	80	75	77	68	50	92	87
499. Bumper : Car	86	85	83	77	77	74	58	45	87	78
500. Wax : Candle	88	87	88	90	80	69	70	41	82	83

References

Dawis, R. V. and Siojo, L. T. Analogical reasoning: A review of the literature. Technical Report No. 1, October, 1972, University of Minnesota. Contract Number N00014-67-A-0113-0030, Office of Naval Research.

Dawis, R. V., Soriano, L. V., Siojo, L. T., and Haynes, J. L. Demographic factors in the eduction of relations in analogy word pairs. Technical Report No. 3, January, 1974, University of Minnesota. Contract Number N00014-67-A-0113-0030, Office of Naval Research.

Dawis, R. V., Haynes, J. L., Soriano, L. V., Siojo, L. T. Relation eduction index norms for 1500 word pairs and 10 relations: High school sample. Technical Report No. 5, May, 1974, University of Minnesota. Contract Number N00014-67-A-0113-0030, Office of Naval Research.

Guilford, J. P. and Hoepfner, R. The analysis of intelligence. New York: McGraw Hill, 1971.

Haynes, J. L., Dawis, R. V., Siojo, L. T., Soriano, L. V. Demographic factors in the identification of pictures. Technical Report No. 2, November, 1973, University of Minnesota. Contract Number N00014-67-A-0113-0030, Office of Naval Research.

Soriano, L. V., Dawis, R. V., and Siojo, L. T. Relation eduction index norms for 1000 word pairs and 8 relations: College sample. Technical Report No. 4, February, 1974, University of Minnesota. Contract Number N00014-67-A-0113-0030, Office of Naval Research.

APPENDIX

INSTRUCTIONS TO TEACHERS

This exercise consists of a seven page booklet and an answer sheet. The booklet consists of a cover page, a Biographical Information page, an Instruction page, five pages of picture pairs (100 pairs of pictures), and a back cover which is blank.

The top lines of the cover page identify this project with the Department of Psychology, University of Minnesota. The exercise title, PICTURE RELATIONS STUDY, and form number are located in the center of the page and the identifying date appears at the bottom of the page.

The answer sheet must match the exercise booklet in three important ways: 1) Form number, 2) Biographical Information, and 3) The students' responses to the picture-pair relations.

The instructions and examples on the Instruction page are given to help the student understand these exercises and formulate his/her responses. When going through the instruction page with the students, please note that all students will not be working with the same relation and the same examples. There are ten different relations and they will be randomly assigned to students.

After the students have received their exercise booklets and answer sheets, they should proceed as follows:

1) Before opening the exercise booklet, write the form number in the indicated space on the top right corner of the answer sheet.

2) Open the exercise booklet and complete the Biographical Information section by filling in the boxes on the answer sheet with the appropriate number from the Biographical Information questionnaire.

3) Study the instructions page with the aid of teachers.

4) After studying the instructions, the students should begin responding to the picture exercises. The students should circle <u>yes</u> if they think the picture-pair relation defined in the instruction page is present and <u>no</u> if they do not think the relation is present.

Department of Psychology
University of Minnesota

PICTURE RELATIONS STUDY

Form 8-B

Spring 1974

BIOGRAPHICAL INFORMATION

1. School

01. Bartlett	07. Raleigh
02. Bolton	08. Tipton Co. 1
03. Collierville	09. Tipton Co. 2
04. Germantown	10. Tipton Co. 3
05. Millington	11. Tipton Co. 4
06. Murray	12. Tipton Co. 5

2. Grade _____

3. Sex

1. Male
2. Female

4. Age at last birthday _____

5. Race:

1. Afro-American (Negro)
2. Mexican-American (Chicano)
3. American-Indian
4. Oriental-American
5. White
6. Other

6. Number of children in family:

1. 1 to 3
2. 4 to 6
3. 7 to 9
4. 10 or more

7. Annual family income:

1. less than $5,000
2. $5,000 - $10,000
3. $10,001 - $15,000
4. $15,001 - $20,000
5. more than $20,000

8. Which of the following is true of your family?

1. Owns the house in which you live
2. Rents the house in which you live
3. Rents an apartment unit
4. Lives in a public housing project

9. Which is true of your father's education?

1. Finished eighth grade or less
2. Went to high school but did not graduate
3. Finished high school but did not go to college
4. Went to college but did not get a degree
5. Graduated with a bachelor's degree or its equivalent
6. Did college study beyond the bachelor's level
7. If other, please specify

10. Which is true of your mother's education?

BEST COPY AVAILABLE

1. Finished eighth grade or less
2. Went to high school but did not graduate
3. Finished high school but did not go to college
4. Went to college but did not get a degree
5. Graduated with a bachelor's degree or its equivalent
6. Did college study beyond the bachelor's level
7. If other, please specify

11. In which of the following categories does your father's main occupation belong? Examples of job titles within a category are shown in parenthesis.

1. Professional, technical, and managerial occupations (lawyers, doctors, teachers, engineers, writers and managers)
2. Clerical and sales occupations (typists, stenographers, salesmen and merchants)
3. Service occupations (domestic servants, barbers, protective servants, and waiters)
4. Farming, fishery, forestry, and related occupations (farmers, for sters, hunters and fishermen)
5. Processing occupations (processors of chemicals, wood, metal, food and tobacco)
6. Machine trades occupation (machinists, printers and textile workers)
7. Bench work occupation (fabricators, assemblers, repairmen)
8. Structural work occupations (metal fabricators, welders, and construction workers)
9. Miscellaneous occupations (truck drivers, packers, loggers and graphic artists)

12. In which of the following categories does your mother's main occupation belong? Example of job titles within a category are shown in parenthesis.

1. Professional, technical, and managerial occupations (lawyers, doctors, teachers, engineers, writers and managers)
2. Clerical and sales occupations (typists, stenographers, salespersons and merchants)
3. Service occupations (domestic servants, barbers, protective servants, and waiters)
4. Farming, fishery, forestry, and related occupations (farmers, foresters, hunters and fishermen)
5. Processing occupations (processors of chemicals, wood, metal, food and tobacco)
6. Machine trades occupations (machinists, printers and textile workers)
7. Bench work occupation (fabricators, assemblers, repair persons)
8. Structural work occupations (metal fabricators, welders, and construction workers)
9. Miscellaneous occupations (truck drivers, packers, loggers and graphic artists)
10. Housewife

BEST COPY AVAILABLE

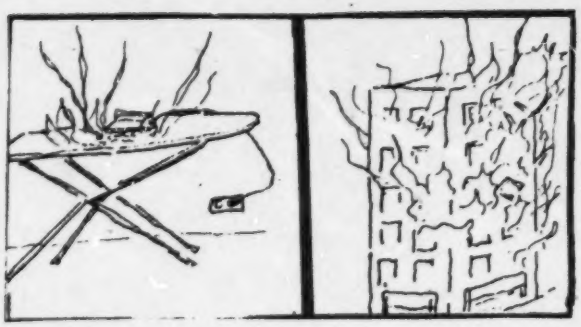
INSTRUCTIONS

1. Definition of Relation 8 (Cause-effect): Two pictures have this relation when one picture represents an object or event that causes or brings about the other object or event.

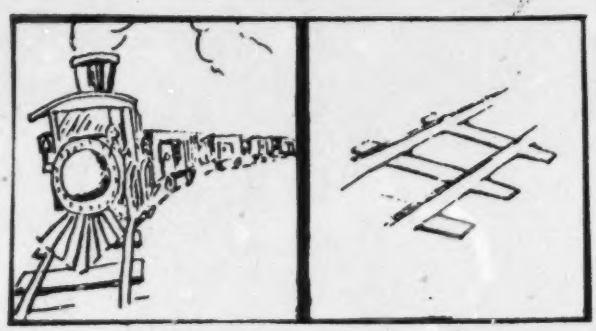
2. In the following examples circle yes if you think the relation, Cause-effect, is present, and no if you do not think the relation is present.

Examples:

1. Yes No



2. Yes No

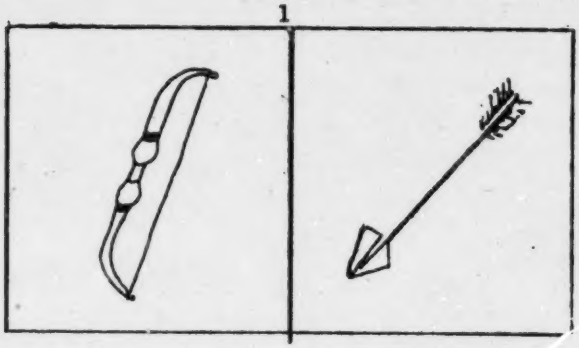


You should have circled yes for Number 1 and no for Number 2. In Number 1, a small fire can cause a huge fire. In Number 2, a train cannot cause a railroad track, nor can a railroad track cause a train.

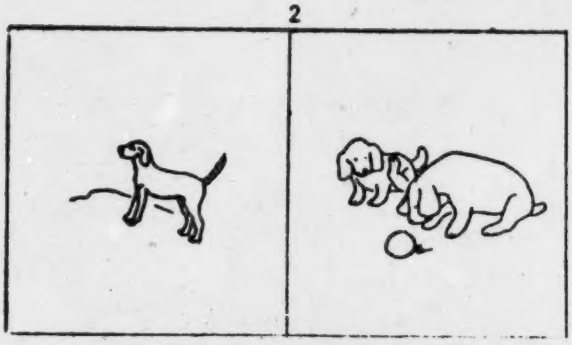
3. On the following pages you will find 100 pairs of pictures. Circle yes in the appropriate place on the answer sheet if you think the relation, Cause-effect, is present. Circle no if you do not think the relation is present.

BEST COPY AVAILABLE

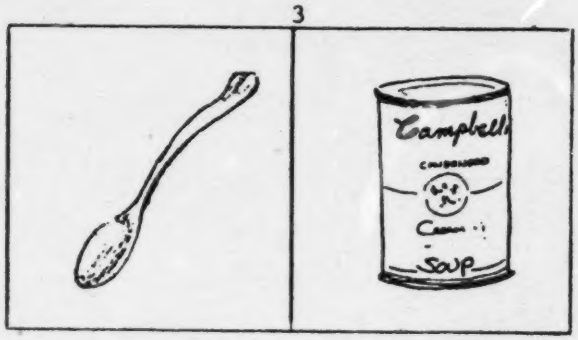
1



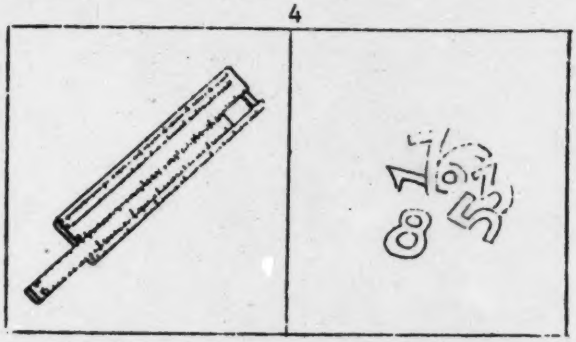
2



3

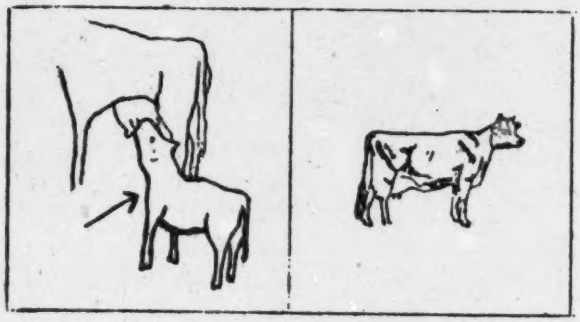


4

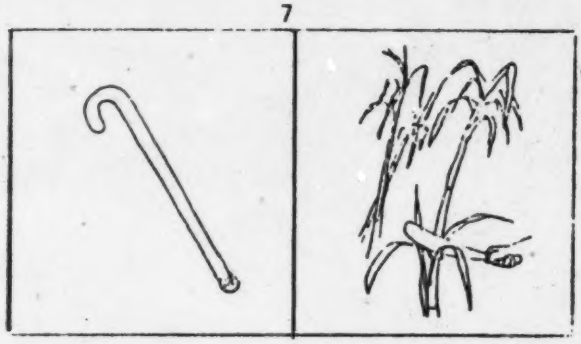


5

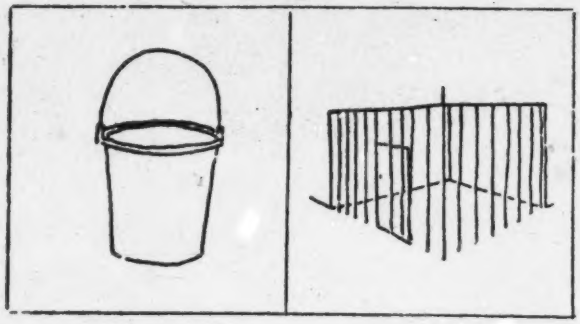
6



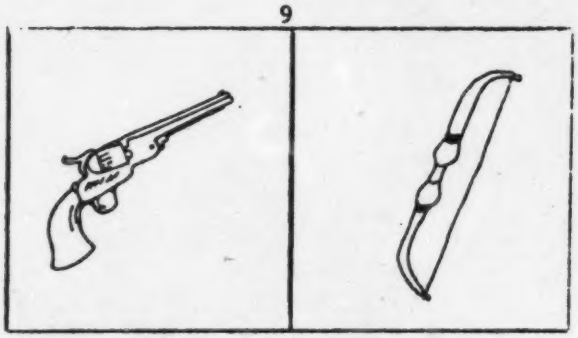
7



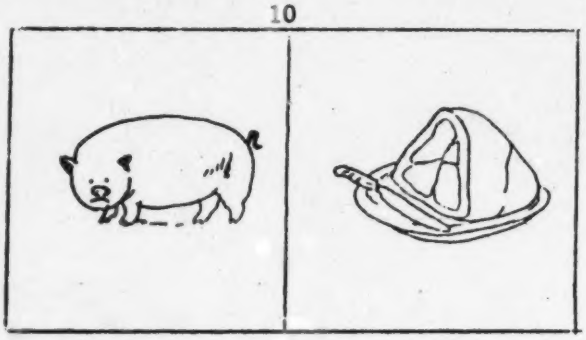
8



9



10



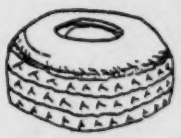
BEST COPY AVAILABLE

11

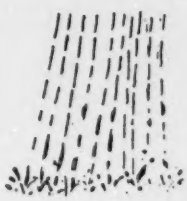
12

13

14



15



16

17

18

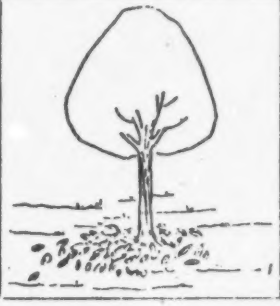
19

20

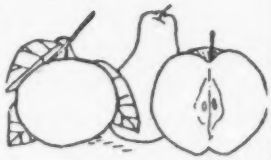
BEST COPY AVAILABLE

21

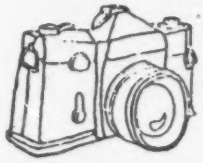
22



23



24



25

26

27

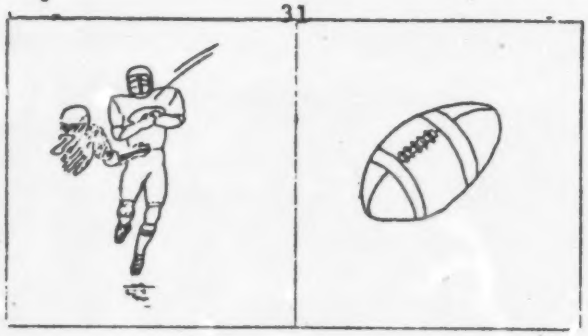
28

29

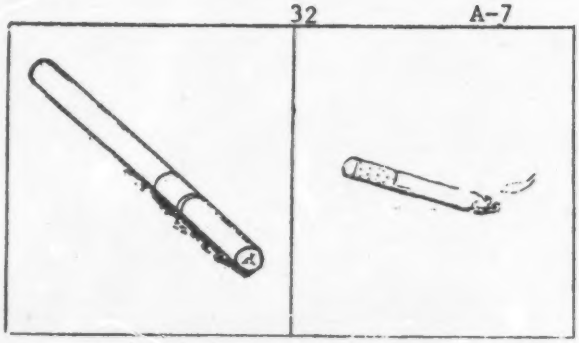
30

BEST COPY AVAILABLE

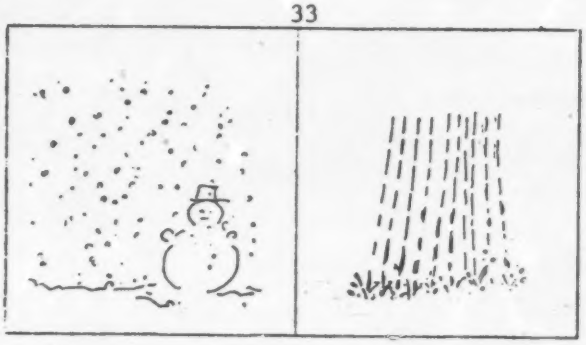
31



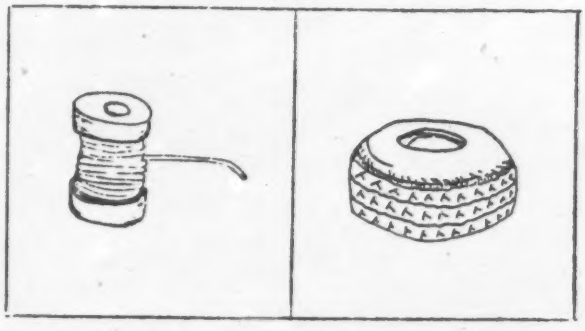
32



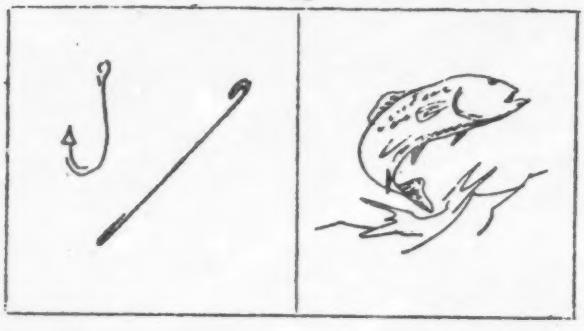
33



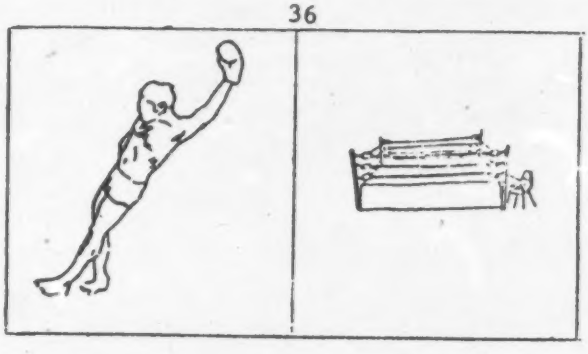
34



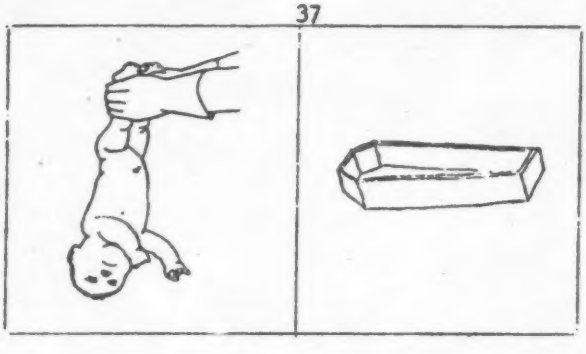
35



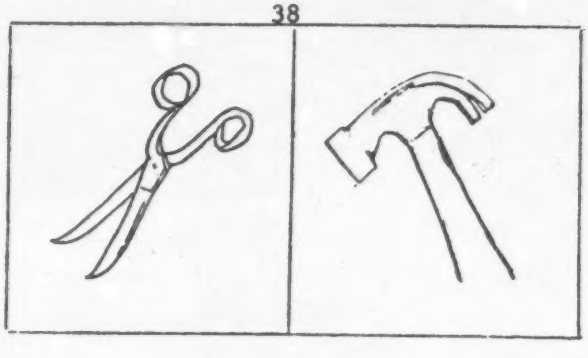
36



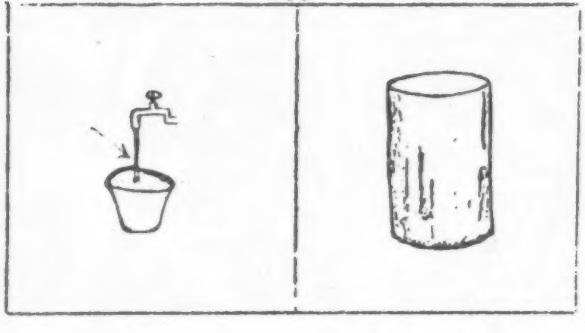
37



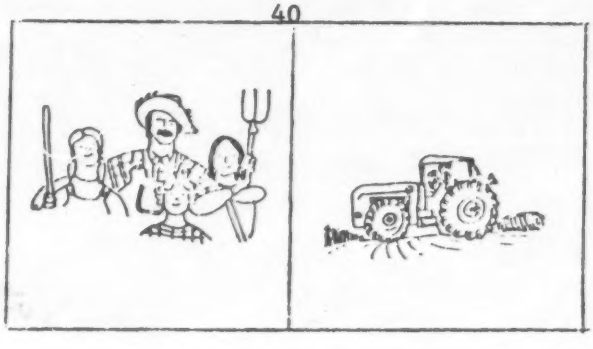
38



39

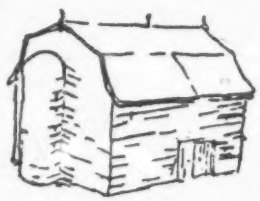


40

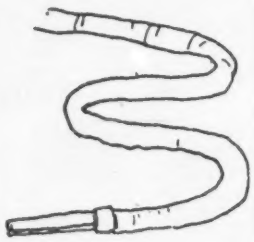


BEST COPY AVAILABLE

41

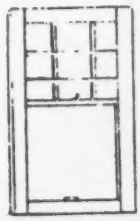


42



43

44

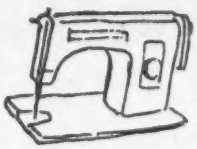


45

46

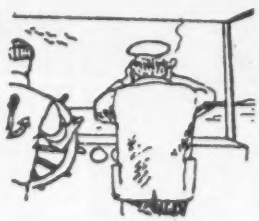
47

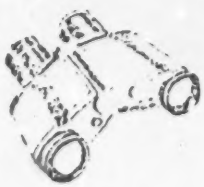
48



49

50





BEST COPY AVAILABLE

51

52

53

54

55

56

57

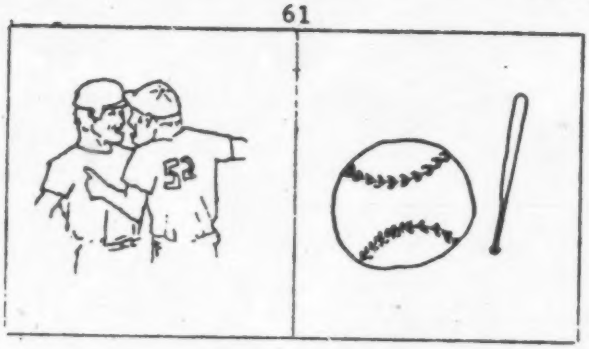
58

59

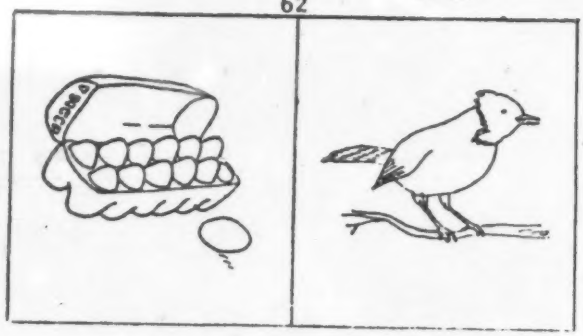
60

BEST COPY AVAILABLE

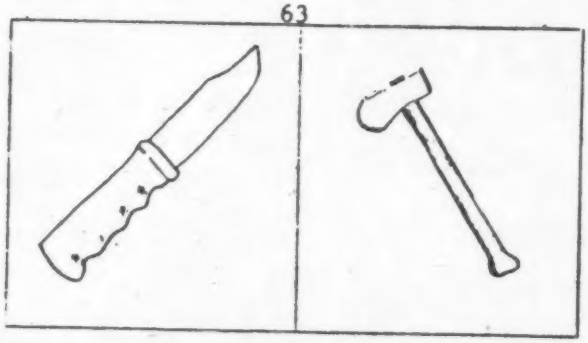
61



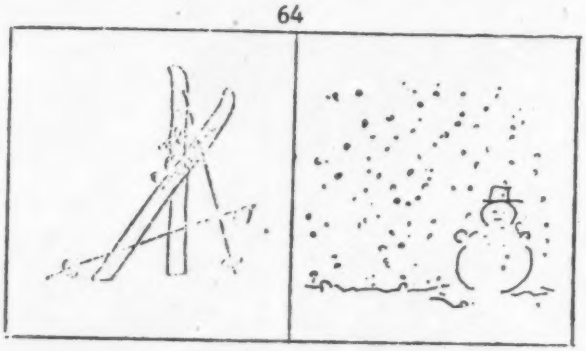
62



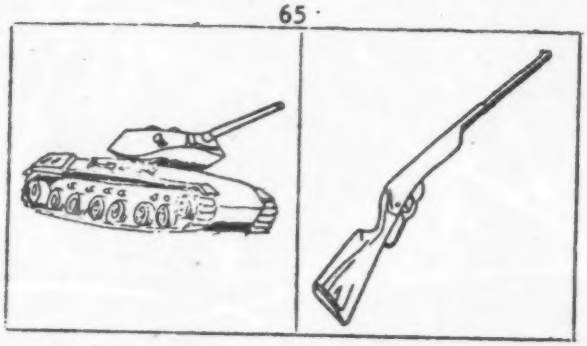
63



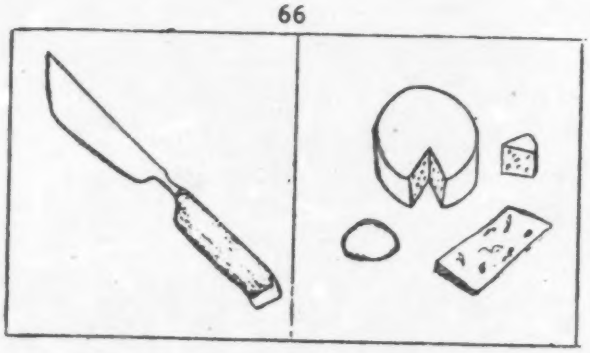
64



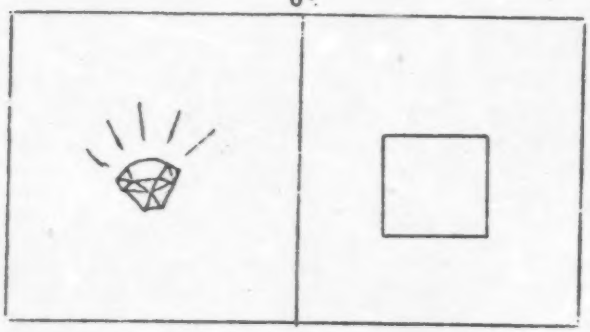
65



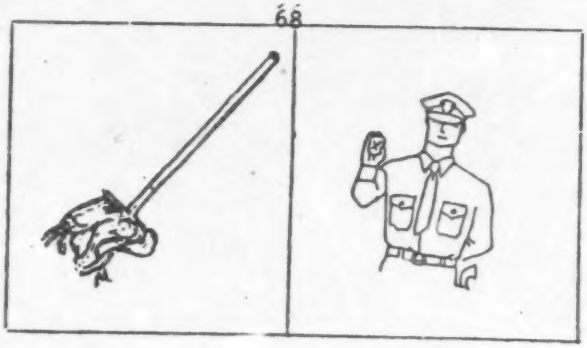
66



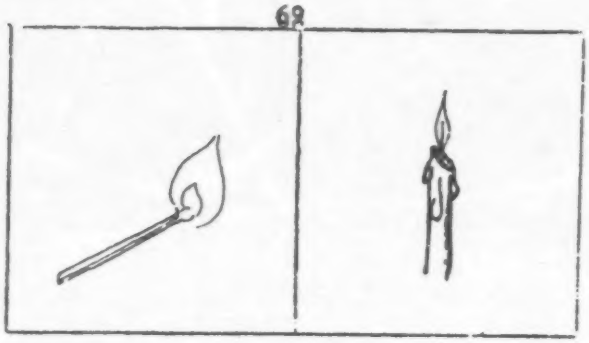
67



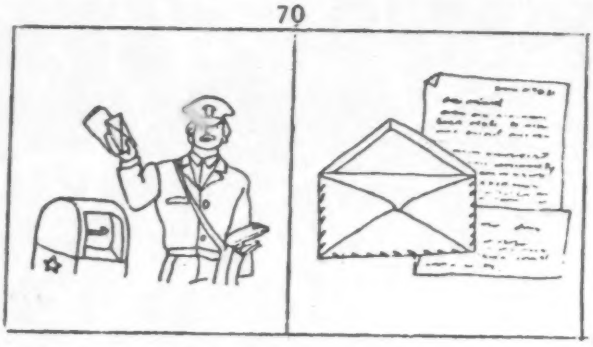
68



69



70

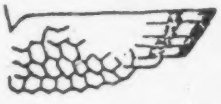


BEST COPY AVAILABLE

71

72

73



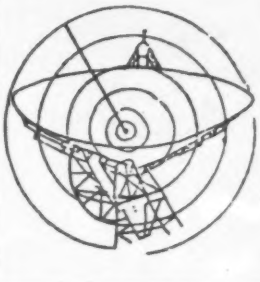
74

75

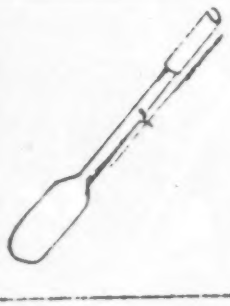
76

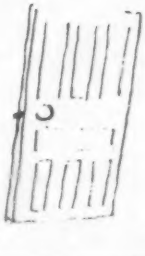
77

78



79



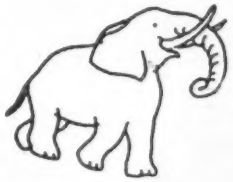


80

BEST COPY AVAILABLE

81

82

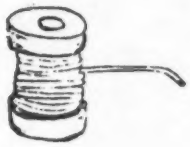


83

84

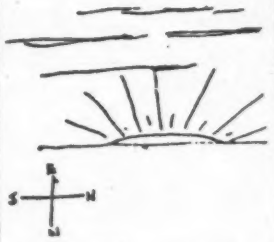
85

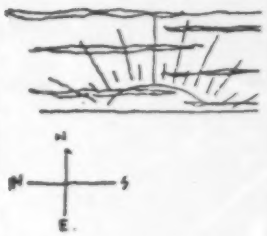
86



87

88



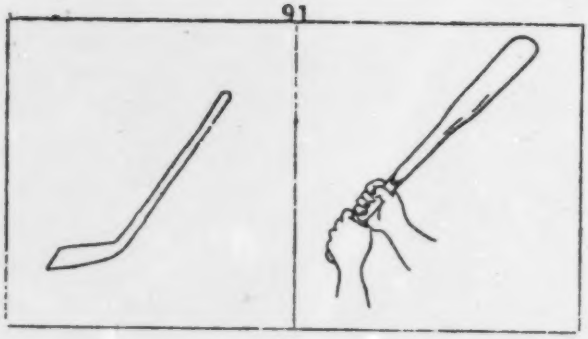


89

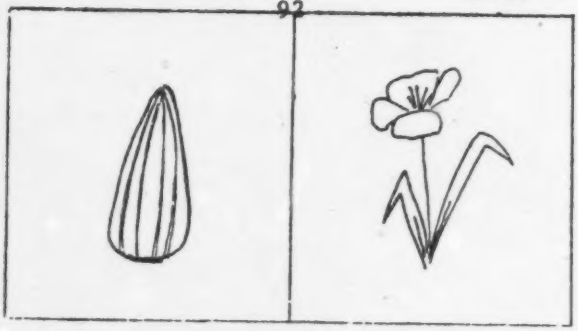
90

BEST COPY AVAILABLE

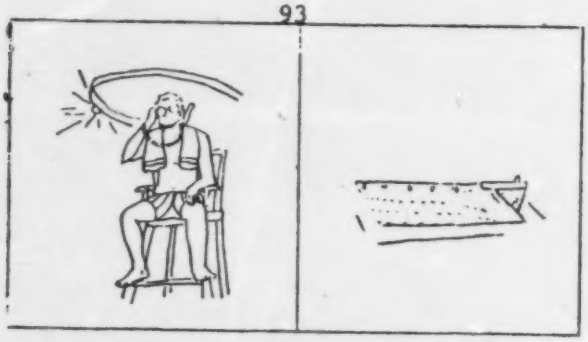
91



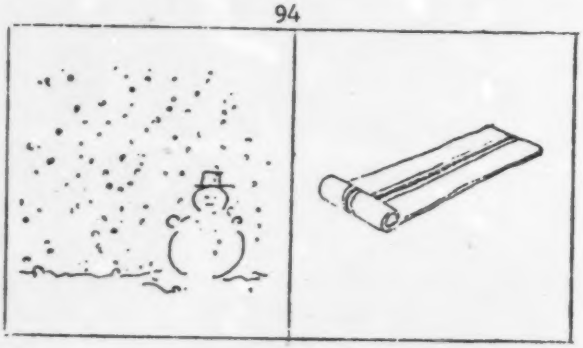
92



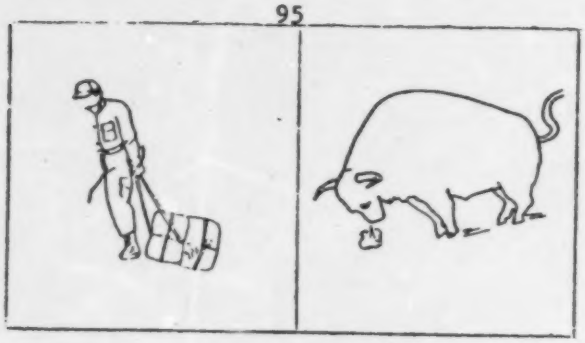
93



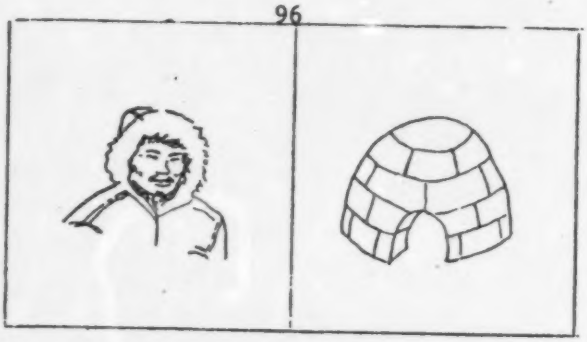
94



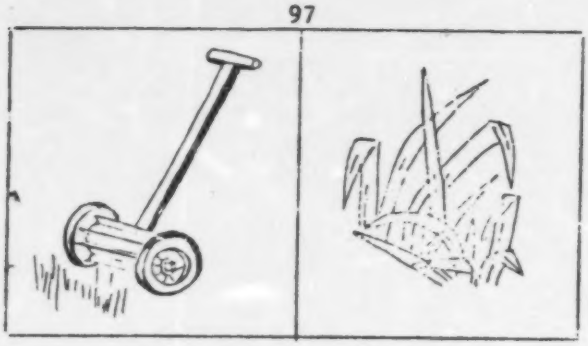
95



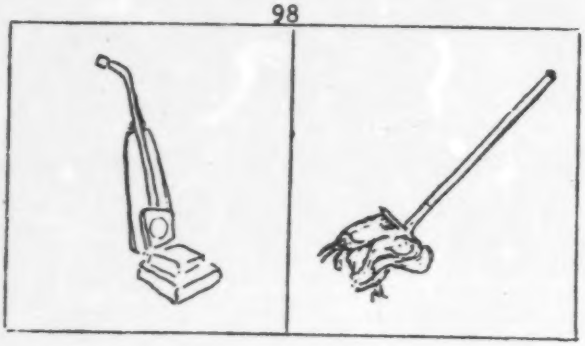
96



97

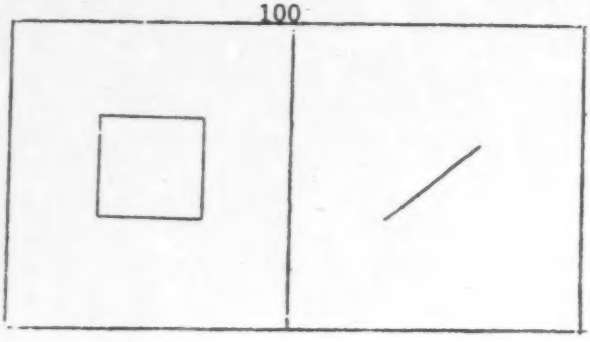


98



99

100



Spring 1974 Form ___

PICTURE RELATIONS STUDY ANSWER SHEET

PART I. BIOGRAPHICAL INFORMATION

Fill in the boxes with the appropriate number from the biographical information questionnaire.

1.☐ 2.☐ 3.☐ 4.☐ 5.☐ 6.☐ 7.☐ 8.☐ 9.☐ 10.☐ 11.☐ 12.☐

PART II. PICTURE-PAIR RELATIONSHIPS

Circle yes if you think the relation defined in your booklet is present in the picture pair and no if you do not think the relation is present.

1. yes	no	21. yes	no	41. yes	no	61. yes	no	81. yes	no
2. yes	no	22. yes	no	42. yes	no	62. yes	no	82. yes	no
3. yes	no	23. yes	no	43. yes	no	63. yes	no	83. yes	no
4. yes	no	24. yes	no	44. yes	no	64. yes	no	84. yes	no
5. yes	no	25. yes	no	45. yes	no	65. yes	no	85. yes	no
6. yes	no	26. yes	no	46. yes	no	66. yes	no	86. yes	no
7. yes	no	27. yes	no	47. yes	no	67. yes	no	87. yes	no
8. yes	no	28. yes	no	48. yes	no	68. yes	no	88. yes	no
9. yes	no	29. yes	no	49. yes	no	69. yes	no	89. yes	no
10. yes	no	30. yes	no	50. yes	no	70. yes	no	90. yes	no
11. yes	no	31. yes	no	51. yes	no	71. yes	no	91. yes	no
12. yes	no	32. yes	no	52. yes	no	72. yes	no	92. yes	no
13. yes	no	33. yes	no	53. yes	no	73. yes	no	93. yes	no
14. yes	no	34. yes	no	54. yes	no	74. yes	no	94. yes	no
15. yes	no	35. yes	no	55. yes	no	75. yes	no	95. yes	no
16. yes	no	36. yes	no	56. yes	no	76. yes	no	96. yes	no
17. yes	no	37. yes	no	57. yes	no	77. yes	no	97. yes	no
18. yes	no	38. yes	no	58. yes	no	78. yes	no	98. yes	no
19. yes	no	39. yes	no	59. yes	no	79. yes	no	99. yes	no
20. yes	no	40. yes	no	60. yes	no	80. yes	no	100. yes	no

DISTRIBUTION LIST

Navy

4 Dr. Marshall J. Farr, Director
Personnel and Training Research Programs
Office of Naval Research (Code 458)
Arlington, VA 22217

1 ONR Branch Office
495 Summer Street
Boston, MA 02210
ATTN: J. Lester

1 ONR Branch Office
1030 East Green Street
Pasadena, CA 91101
ATTN : E.E. Gloye

1 ONR Branch Office
536 South Clark Street
Chicago, IL 60605
ATTN : M.A. Bertin

1 Office of Naval Research
Area Office
207 West 24th Street
New York, NY 10011

6 Director
Naval Research Laboratory
Code 2627
Washington, D.C. 20390

12 Defense Documentation Center
Cameron Station, Building 5
5010 Duke Street
Alexandria, VA 22314

1 Special Assistant for Manpower
OASN (M&RA)
Pentagon, Room 4E794
Washington, D.C. 20350

1 LCDR Charles J. Theisen, Jr., MSC, USN
4024
Naval Air Development Center
Warminster, PA 18974

1 Chief of Naval Reserve
Code 3055
New Orleans, LA 70146

1 Dr. Lee Miller
Naval Air Systems Command
AIR-413E
Washington, D.C. 20361

1 CAPT John F. Riley, USN
Commanding Officer
U.S. Naval Amphibious School
Coronado, CA 92155

1 Chief
Bureau of Medicine & Surgery
Research Division (Code 713)
Washington, D.C. 20372

1 Chairman
Behavioral Science Department
Naval Command & Management Division
U.S. Naval Academy
Luce Hall
Annapolis, MD 21402

1 Chief of Naval Education & Training
Naval Air Station
Pensacola, FL 32508
ATTN: CAPT Bruce Stone, USN

1 Mr. Arnold Rubinstein
Naval Material Command (NAVMAT 03424)
Room 820, Crystal Plaza #6
Washington, D.C. 20360

1 Commanding Officer
Naval Medical Neuropsychiatric
Research Unit
San Diego, CA 92152

1 Director, Navy Occupational Task
Analysis Program (NOTAP)
Navy Personnel Program Support Activity
Building 1304, Bolling AFB
Washington, D.C. 20336

1 Dr. Richard J. Niehaus
Office of Civilian Manpower Management
Code 06A
Washington, D.C. 20390

BEST COPY AVAILABLE

Navy (cont.)

1 Department of the Navy
Office of Civilian Manpower Management
Code 263
Washington, DC 20390

1 Chief of Naval Operations (OP-987E)
Department of the Navy
Washington, DC 20350

1 Superintendent
Naval Postgraduate School
Monterey, CA 93940
ATTN: Library (Code 2124)

1 Commander, Navy Recruiting Command
4015 Wilson Boulevard
Arlington, VA 22203
ATTN: Code 015

1 Mr. George N. Graine
Naval Ship Systems Command
SHIPS 047C12
Washington, DC 20362

1 Chief of Naval Technical Training
Naval Air Station Memphis (75)
Millington, TN 38054
ATTN: Dr. Norman J. Kerr

1 Dr. William L. Maloy
Principal Civilian Advisor
for Education & Training
Naval Training Command, Code 01A
Pensacola, FL 32508

1 Dr. Alfred F. Smode, Staff Consultant
Training Analysis & Evaluation Group
Naval Training Equipment Center
Code N-00T
Orlando, FL 32813

1 Dr. Hanns H. Wolff
Technical Director (Code N-2)
Naval Training Equipment Center
Orlando, FL 32813

1 Chief of Naval Training Support
Code N-21
Building 45
Naval Air Station
Pensacola, FL 32508

1 Mr. Dave Robertson
Navy Personnel R&D Center
San Diego, CA 92152

5 Navy Personnel R&D Center
San Diego, CA 92152
ATTN: Code 10

1 D.M. Gragg, CAPT, MC, USN
Head, Educational Programs Development
Department
Naval Health Sciences Education and
Training Command
Bethesda, MD 20014

Army

1 Headquarters
U.S. Army Administration Center
Personnel Administration Combat
Development Activity
ATCP-HRO
Ft. Benjamin Harrison, IN 46249

1 Armed Forces Staff College
Norfolk, VA 23511
ATTN: Library

1 Commandant
United States Army Infantry School
ATTN: ATSH-DET
Fort Benning, GA 31905

1 Deputy Commander
U.S. Army Institute of Administration
Fort Benjamin Harrison, IN 46216
ATTN: EA

1 Dr. Stanley L. Cohen
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 Dr. Ralph Dusek
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 Mr. Edmund F. Fuchs
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

Army (cont.)

1 Dr. J.E. Uhlaner, Technical Director
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 HQ USAREUR & 7th Army
ODCSOPS
USAREUR Director of GED
APO New York 09403

Air Force

1 Research Branch
AF/DPMYAR
Randolph AFB, TX 78148

1 Dr. G.A. Eckstrand (AFHRL/AS)
Wright-Patterson AFB
Ohio 45433

1 AFHRL/DOJN
Stop #63
Lackland AFB, TX 78236

1 Dr. Robert A. Bottenberg (AFHRL/SM)
Stop #63
Lackland AFB, TX 78236

1 Dr. Martin Rockway (AFHRL/TT)
Lowry AFB
Colorado 80230

1 Major P.J. DeLeo
Instructional Technology Branch
AF Human Resources Laboratory
Lowry AFB, CO 80230

1 AFOSR/NL
1400 Wilson Boulevard
Arlington, VA 22209

1 Commandant
USAF School of Aerospace Medicine
Aeromedical Library (SUL-4)
Brooks AFB, TX 78235

1 CAPT Jack Thorpe, USAF
Flying Training Division (HRL)
Williams AFB, AZ 85224

Marine Corps

1 Mr. E.A. Dover
Manpower Measurement Unit (Code MPI)
Arlington Annex, Room 2413
Arlington, VA 20380

1 Commandant of the Marine Corps
Headquarters, U.S. Marine Corps
Code MPI-20
Washington, D.C. 20380

1 Director, Office of Manpower Utilizatio
Headquarters, Marine Corps (Code MPU)
MCB (Building 2009)
Quantico, VA 22134

1 Dr. A.L. Slafkosky
Scientific Advisor (Code RD-1)
Headquarters, U.S. Marine Corps
Washington, D.C. 20380

Coast Guard

1 Mr. Joseph J. Cowan, Chief
Psychological Research Branch (G-P-1/6)
U.S. Coast Guard Headquarters
Washington, D.C. 20590

Other DOD

1 Lt. Col. Henry L. Taylor, USAF
Military Assistant for Human Resources
OAD (E&LS) ODDR&E
Pentagon, Room 3D129
Washington, D.C. 20301

1 Col. Austin W. Kibler
Advanced Research Projects Agency
Human Resources Research Office
1400 Wilson Boulevard
Arlington, VA 22209

Other Government

1 Dr. Lorraine D. Eyde
Personnel Research and Development
Center
U.S. Civil Service Commission
1900 E. Street, N.W.
Washington, D.C. 20415

BEST COPY AVAILABLE

Other Government (cont.)

1 Dr. William Gorham, Director
Personnel Research and Development Center
U.S. Civil Service Commission
1900 E. Street, N.W.
Washington, D.C. 20415

1 Dr. Vern Urry
Personnel Research and Development Center
U.S. Civil Service Commission
1900 E. Street, N.W.
Washington, D.C. 20415

1 Dr. Andrew R. Molnar
Technological Innovations in Education
National Science Foundation
Washington, D.C. 20550

Miscellaneous

1 Dr. Scarvia B. Anderson
Educational Testing Service
17 Executive Park Drive, N.E.
Atlanta, GA 30329

1 Dr. John Annett
The Open University
Milton Keynes
Buckinghamshire
ENGLAND

1 Dr. Richard C. Atkinson
Stanford University
Department of Psychology
Stanford, CA 94305

1 Dr. Gerald V. Barrett
University of Akron
Department of Psychology
Akron, OH 44325

1 Dr. Bernard M. Bass
University of Rochester
Management Research Center
Rochester, NY 14627

1 Mr. Kenneth M. Bromberg
Manager-Washington Operations
Information Concepts, Inc.
1701 North Fort Myer Drive
Arlington, AV 22209

1 Centry Research Corporation
4113 Lee Highway
Arlington, VA 22207

1 Dr. Kenneth E. Clark
University of Rochester
College of Arts & Sciences
River Campus Station
Rochester, NY 14627

1 Dr. Norman R. Dixon
Room 170
190 Lothrop Street
Pittsburgh, Pa 15260

1 Dr. Robert Dubin
University of California
Graduate School of Administration
Irvine, Ca 92664

1 Dr. Marvin D. Dunnette
University of Minnesota
Department of Psychology
Minneapolis, Mn 55455

1 ERIC
Processing and Reference Facility
4833 Rugby Avenue
Bethesda, MD 20014

1 Dr. Victor Fields
Montgomery College
Department of Psychology
Rockville, MD 20850

1 Dr. Edwin A. Fleishman
American Institutes for Research
Foxhall Square
3301 New Mexico Avenue, N.W.
Washington, D.C. 20016

1 Dr. Robert Glaser, Director
University of Pittsburgh
Learning Research & Development Center
Pittsburgh, PA 15213

1 Mr. Harry H. Harman
Educational Testing Service
Princeton, N.J. 08540

1 Dr. Richard S. Hatch
Decision Systems Associates, Inc.
11428 Rockville Pike
Rockville, MD 20852

Miscellaneous (cont.)

1 Dr. M.D. Havron
Human Sciences Research, Inc.
7710 Old Spring House Road
West Gate Industrial Park
McLean, VA 22101

1 HumRRO
Division No. 3
P.O. Box 5787
Presidio of Monterey, CA 93940

1 HumRRO
Division No. 4, Infantry
P.O. Box 2086
Fort Benning, GA 31905

1 HumRRO
Division No. 5, Air Defense
P.O. Box 6057
Fort Bliss, TX

1 HumRRO
Division No. 6, Library
P.O. Box 428
Fort Rucker, IL 36360

1 Dr. Lawrence B. Johnson
Lawrence Johnson & Associates, Inc.
200 S. Street, N.W., Suite 502
Washington, D.C. 20009

1 Dr. Steven W. Keele
University of Oregon
Department of Psychology
Eugene, OR 97403

1 Dr. David Klahr
Carnegie-Mellon University
Department of Psychology
Pittsburgh, PA 15213

1 Dr. Frederick M. Lord
Educational Testing Service
Princeton, N.J. 08540

1 Dr. Ernest J. McCormick
Purdue University
Department of Psychological Sciences
Lafayette, IN 47907

1 Dr. Robert R. Mackie
Human Factors Research , Inc.
6780 Cortona Drive
Santa Barbara Research Park
Goleta, CA 93017

1 Mr. Edmond Marks
405 Old Main
Pennsylvania State University
University Park, PA 16802

1 Dr. Leo Munday, Vice-President
American College Testing Program
P.O. Box 168
Iowa City, IA 52240

1 Mr. Luigi Petrullo
2431 North Edgewood Street
Arlington, VA 22207

1 Dr. Diane M. Ramsey-Klee
R-K Research & System Design
3947 Ridgemont Drive
Malibu, CA 90265

1 Dr. Joseph W. Rigney
University of Southern California
Behavioral Technology Laboratories
3717 South Grand
Los Angeles, CA 90007

1 Dr. Leonard L. Rosenbaum, Chairman
Montgomery College
Department of Psychology
Rockville, MD 20850

1 Dr. George E. Rowland
Rowland and Company, Inc.
P.O. Box 61
Haddonfield, N.J. 08033

1 Dr. Arthur I. Siegel
Applied Psychological Services
404 East Lancaster Avenue
Wayne, PA 19087

1 Dr. C. Harold Stone
1428 Virginia Avenue
Glendale, CA 91202

1 Dr. Benton J. Underwood
Northwestern University
Department of Psychology
Evanston, IL 60201

1 Dr. David J. Weiss
University of Minnesota
Department of Psychology
Minneapolis, MN 55455